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JAPANESE [JP,2001-229542,A]

CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE INVENTION TECHNICAL PROBLEM MEANS DESCRIPTION OF DRAWINGS DRAWINGS

[Translation done.]

* NOTICES *

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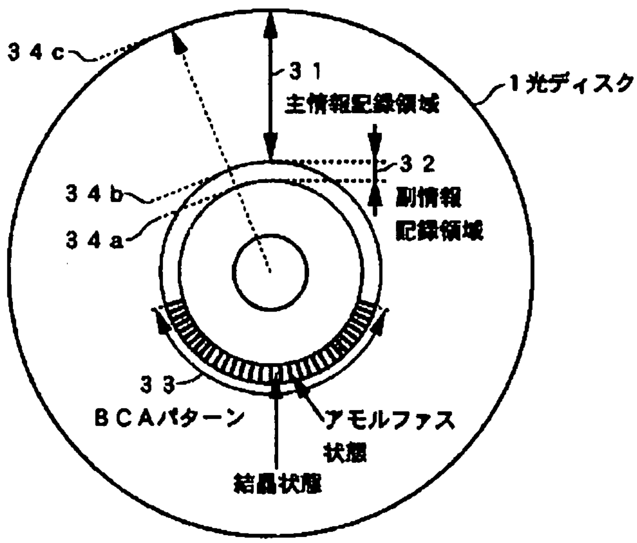
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] The main information field which can record an information signal, and said information signal are divided and equipped with the subinformation field which records the subinformation from which a class differs in the direction of 1 principal plane of a substrate. The lead-in groove area of said subinformation field is also equipped with the information layer which records said information signal in said main information field. The optical recording medium which records the medium identification information which identifies said medium optically on said information layer of said lead-in groove area is used. After scanning the light beam which piles up said a part of spot in the direction of vertical scanning of the main scanning direction of the hoop direction of said spot, and the direction of a path of said spot, irradiating the spot of a light beam and recording said medium identification information on an information layer, The record approach of the optical recording medium characterized by performing said information signal record by the light beam modulation technique of said medium identification information record, and different modulation technique.
[Claim 2] The record approach of an optical recording medium according to claim 1 of carrying out the phase change of said main information field to a crystallized state succeedingly for initialization after performing medium identification information record.
[Claim 3] The record approach of an optical recording medium according to claim 1 or 2 of reducing the light beam reinforcement which irradiates said information layer for record of said medium identification information rather than the light beam reinforcement which irradiates said information layers other than said medium identification information.
[Claim 4] The record approach of an optical recording medium given in any 1 term of claims 1-3 with same component of said information layer of said main information field and component of said information layer of said lead-in groove area.
[Claim 5] It is the record approach of an optical recording medium given in any 1 term of claims 1-4 to which an optical recording medium is a disk type-like medium, and a subinformation field exists in the location which met the inner skin of said main information field of said disk type-like medium.
[Claim 6] The record approach of an optical recording medium given in any 1 term of claims 1-5 to which lead-in groove area exists in the range of 22.3mm or more 23.5mm or less from the core of a disk type-like medium.
[Claim 7] The record approach of an optical recording medium given in any 1 term of claims 1-6 recorded on a subinformation field by the postscript field (Burst Cutting Area) which carried out overwrite to said information layer of the pit formation field in said lead-in groove area so that it may leave an amorphous condition to lead-in groove area in the shape of a stripe or may leave a crystallized state in the shape of a stripe.

[Translation done.]

Drawing selection Representative drawing



[Translation done.]

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] The block diagram showing an example of the recording apparatus of this invention
[Drawing 2] The important section cross-section block diagram of an example of an optical disk applicable to this invention
[Drawing 3] The plan showing an example of an optical disk applicable to this invention
[Drawing 4] The flow chart showing an example of the medium identification information record approach of this invention
[Drawing 5] Drawing showing the timing chart of an example of the medium identification information record approach of this invention
[Drawing 6] Drawing showing an example of the medium identification information record approach of this invention
[Drawing 7] The plan showing this record approach
[Drawing 8] The block diagram showing other examples of the recording apparatus of this invention
[Drawing 9] The flow chart showing other examples of the medium identification information record approach of this invention
[Drawing 10] The flow chart of this record approach
[Drawing 11] It is a laser output wave form chart in case the laser output wave form chart at the time of (1) creating medium identification information and (2) perform the laser output wave form chart in the case of a phase-number conversion process and (3) performs simultaneously medium identification information and a phase-number conversion process with an example of the laser output wave form chart of another example of medium identification information record of this invention.
[Drawing 12] The flow chart showing another example of the medium identification information record approach of this invention
[Drawing 13] The flow chart of this record approach
[Drawing 14] Drawing showing the timing chart of the medium identification information BCA record approach of the conventional example
[Drawing 15] For (a), the block diagram showing an example of the modulation section of the recording apparatus of this invention and (b) are the block diagram showing an example of the recovery section of the regenerative apparatus of this invention.
[Drawing 16] (a) is the data block diagram at the time of n= 12,188 bytes of BCA of an example of this invention, and (b) is the data block diagram at the time of n = 1 or 12 bytes of BCA of an example of this invention.
[Drawing 17] It is the imagination data block diagram which added 0 in order for the data block diagram at the time of n = 1 or 12 bytes of BCA of an example of this invention to carry out (a) and to carry out the ECC operation of the (b) at the time of n = 1 or 12 bytes of BCA of an example of this invention.
[Drawing 18] For (a), the data block diagram showing an example of the synchronous sign of BCA of this invention and (b) are the data block diagram showing the fixed alignment pattern of BCA of an example of this invention.

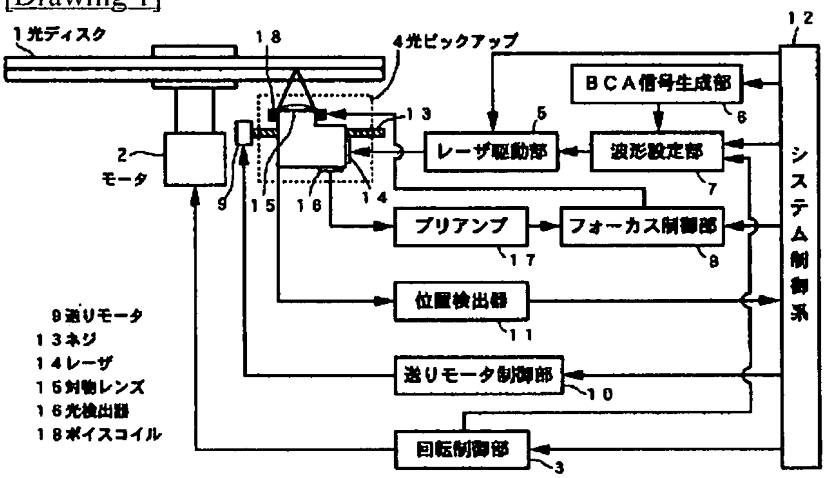
[Drawing 19] The wave form chart showing the modulating signal in the case of the ROM mold disk of an example of this invention
[Drawing 20] The wave form chart showing the modulating signal in the case of the RAM mold disk of an example of this invention
[Drawing 21] The plan showing an example of the location of BCA of the disk of this invention
[Drawing 22] Process drawing showing an example of the forming cycle of the disk of this invention, and the record process of BCA
[Drawing 23] The block diagram of the record regenerative apparatus which uses an example BCA of this invention, and enciphers / decrypts contents
[Drawing 24] Flow chart drawing in the case of carrying out decode playback of the contents of the record regenerative apparatus of an example of this invention
[Description of Notations]
1 Optical Disk
2 Motor
3 Roll Control Section
4 Optical Pickup
5 Laser Actuator
6 BCA Signal Generation Section
7 Wave Setting-Out Section
8 Focal Control Section
9 Delivery Motor
10 Delivery Motor Control Section
11 Position Transducer
12 System Control System
13 Screw
14 Laser
15 Objective Lens
16 Photodetector
17 Pre Amplifier
18 Voice Coil
21 Transparence Substrate
22 Dielectric Layer
23 Recording Layer
24 Dielectric Layer
25 Reflecting Layer
26 Record Film
27 Resin Protective Layer
28 Glue Line
31 The Main Information Record Section
32 SubInformation Record Section
33 BCA Pattern
34 Radius Location
41 Starting Sequence
42 BCA Record Sequence
43 Termination Sequence
61 Light Beam
71 Condensing Spot
72 Movement Magnitude of Optical Pickup
81 BCA Record Control System
82 Initialization Control System
83 Change-over Machine

101 Initialization Sequence
111 Laser Output
121 Starting Sequence
131 Initialization Sequence

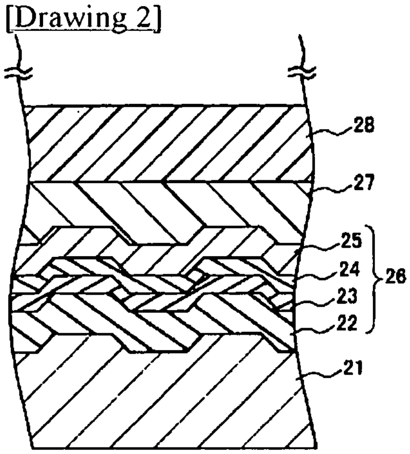
[Translation done.]

DRAWINGS

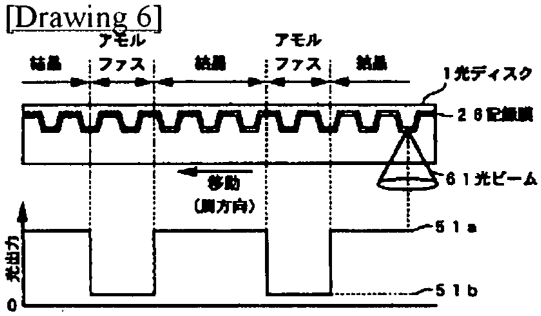
[Drawing 1]



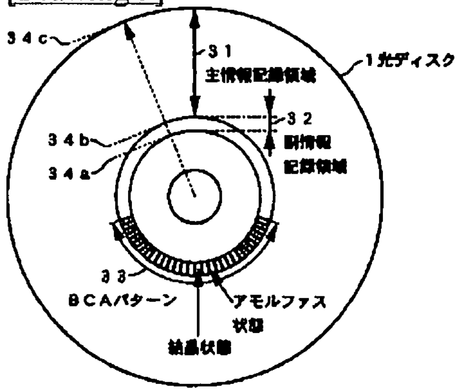
[Drawing 2]



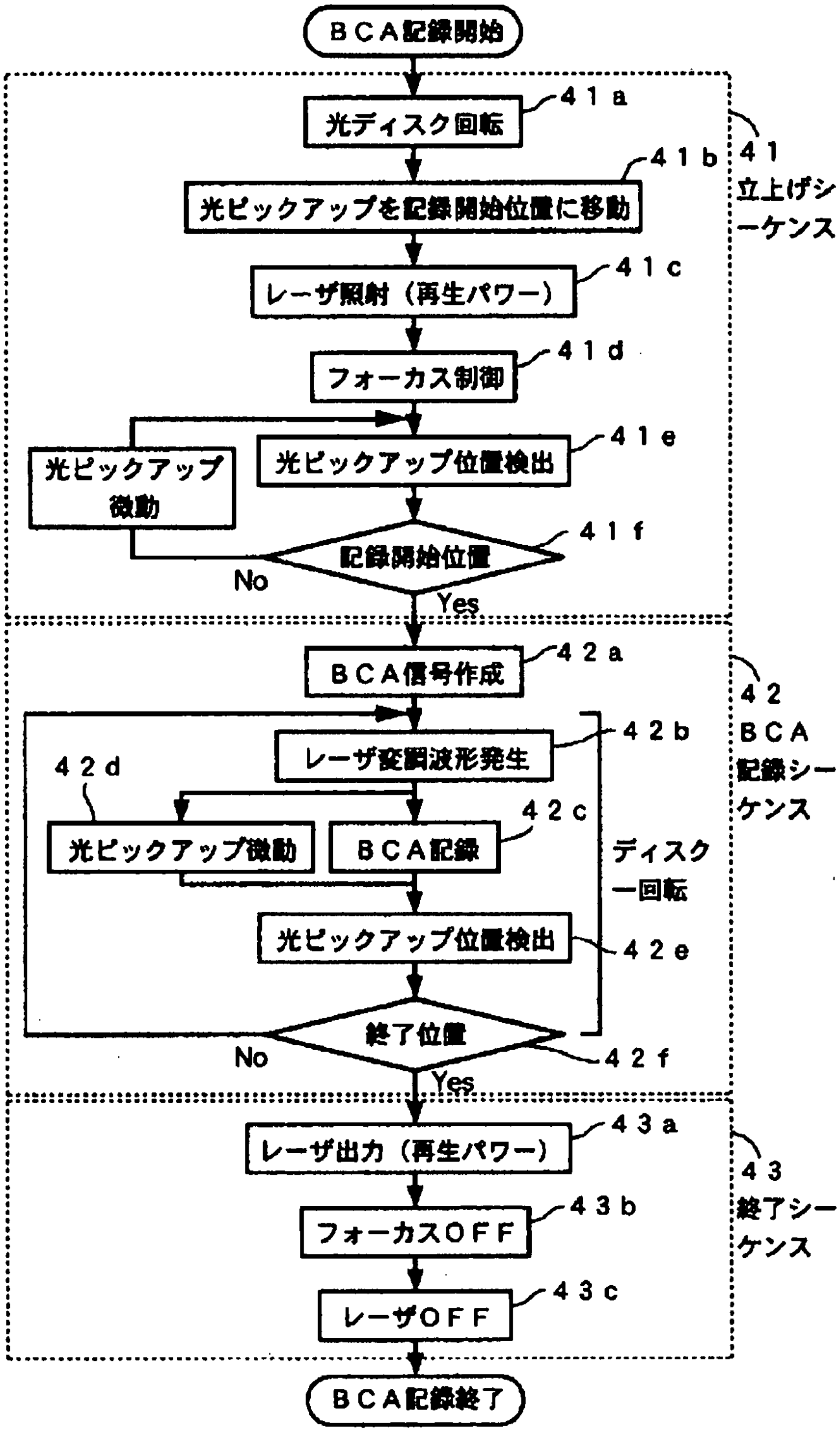
[Drawing 6]



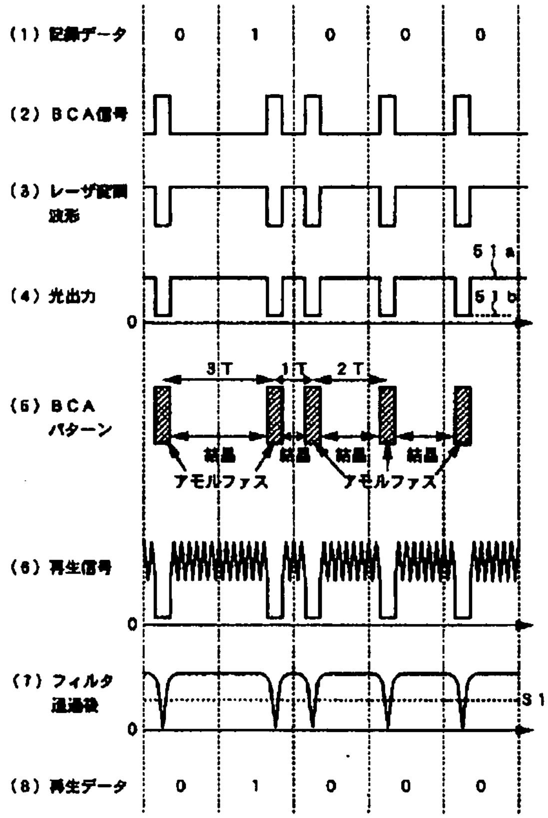
[Drawing 3]



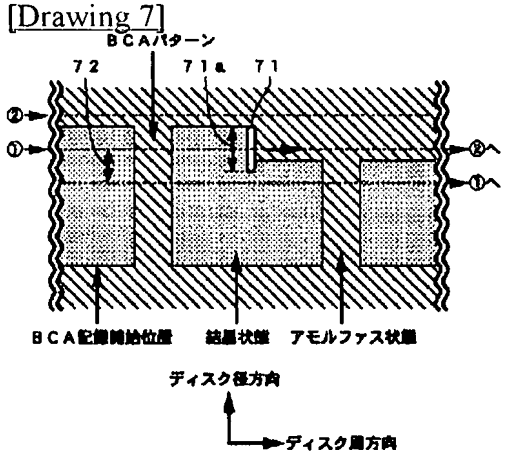
[Drawing 4]


ＢＣＡ記録開始
光ディスク回転
41a
光ピックアップを記録開始位置に移動
41b
41
立上げシーケンス
レーザ照射（再生パワー）
41c
フォーカス制御
41d
光ピックアップ微動
光ピックアップ位置検出
41e
記録開始位置
41f
No
Yes
ＢＣＡ信号作成
42a
42
ＢＣＡ記録シーケンス
レーザ変調波形発生
42b
42d
光ピックアップ微動
ＢＣＡ記録
42c
ディスク一回転
光ピックアップ位置検出
42e
終了位置
42f
No
Yes
レーザ出力（再生パワー）
43a
43
終了シーケンス
フォーカスＯＦＦ
43b
レーザＯＦＦ
43c
ＢＣＡ記録終了

[Drawing 5]

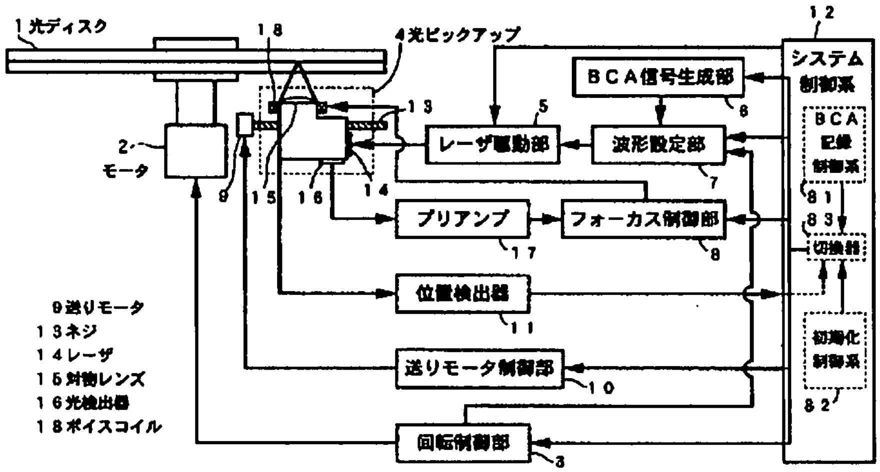


[Drawing 7]

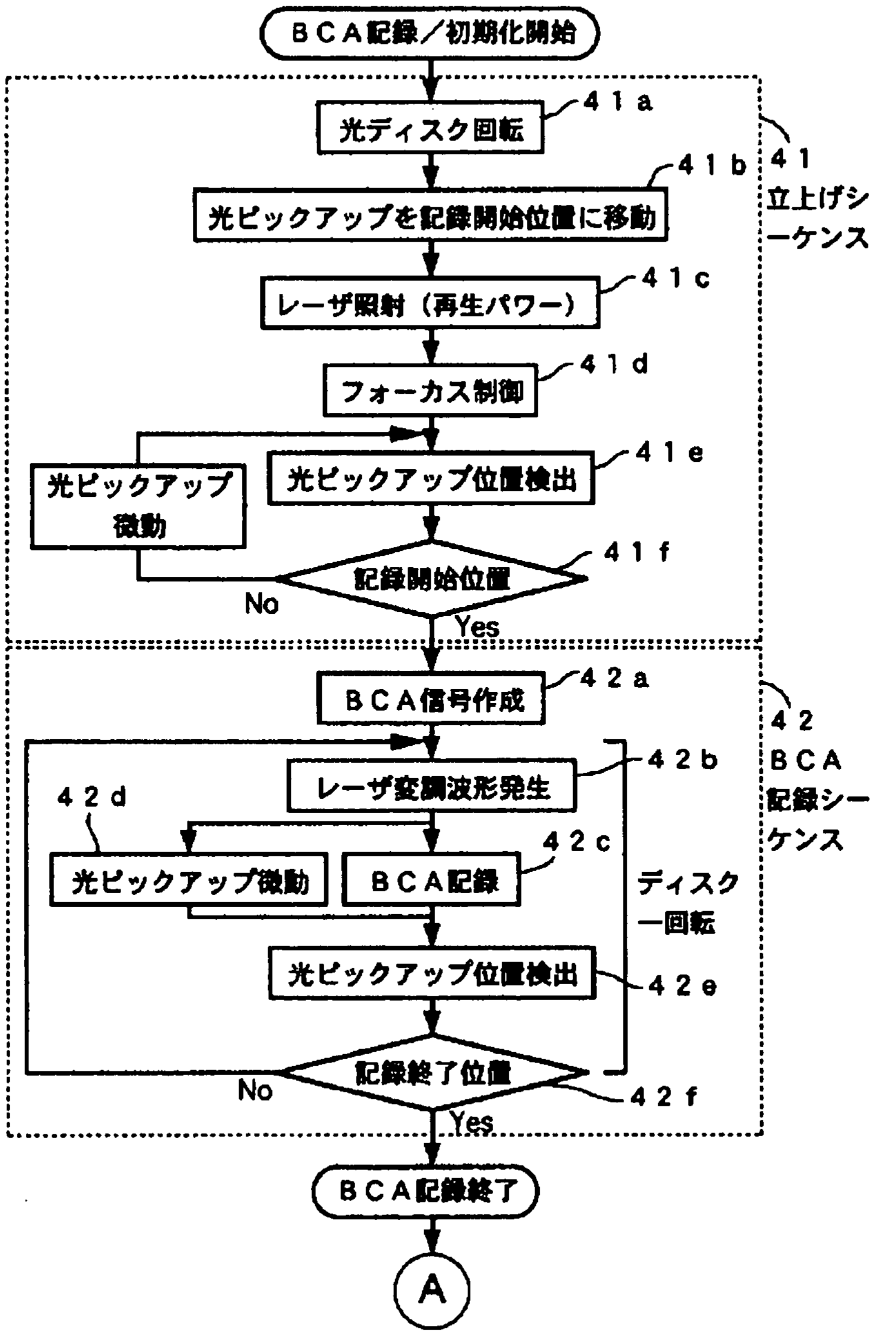


71 集光スポット
71a 集光スポットの径方向長さ
72 光ピックアップの移動量（ディスク1回転あたり）

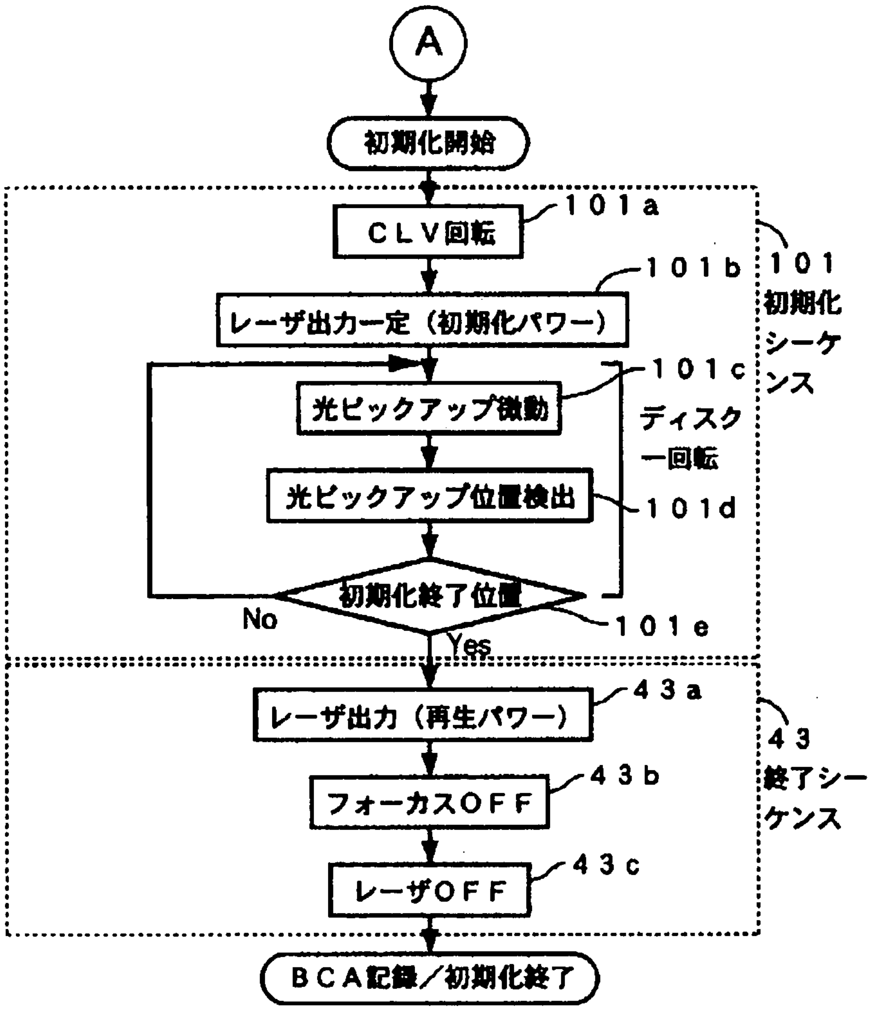
[Drawing 8]


1光ディスク
18
4光ピックアップ
12
システム制御系
BCA信号生成部
6
BCA記録制御系
13
5
2
モータ
レーザ駆動部
波形設定部
7
9
15
16
14
81
83
プリアンプ
フォーカス制御部
17
8
切換器
位置検出器
11
9送りモータ
13ネジ
14レーザ
15対物レンズ
16光検出器
18ボイスコイル
初期化制御系
送りモータ制御部
10
82
回転制御部
3

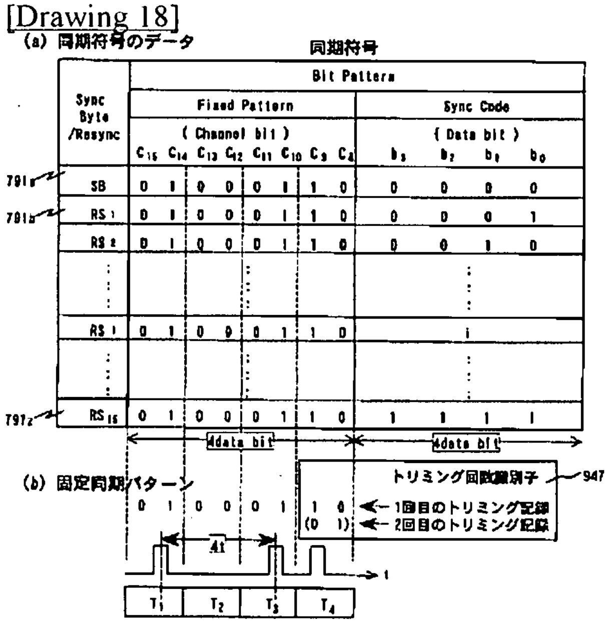
[Drawing 9]


ＢＣＡ記録／初期化開始
光ディスク回転
４１ａ
光ピックアップを記録開始位置に移動
４１ｂ
４１
立上げシーケンス
レーザ照射（再生パワー）
４１ｃ
フォーカス制御
４１ｄ
光ピックアップ微動
光ピックアップ位置検出
４１ｅ
記録開始位置
４１ｆ
No
Yes
ＢＣＡ信号作成
４２ａ
４２
ＢＣＡ記録シーケンス
レーザ変調波形発生
４２ｂ
４２ｄ
光ピックアップ微動
ＢＣＡ記録
４２ｃ
ディスク一回転
光ピックアップ位置検出
４２ｅ
記録終了位置
４２ｆ
No
Yes
ＢＣＡ記録終了
A

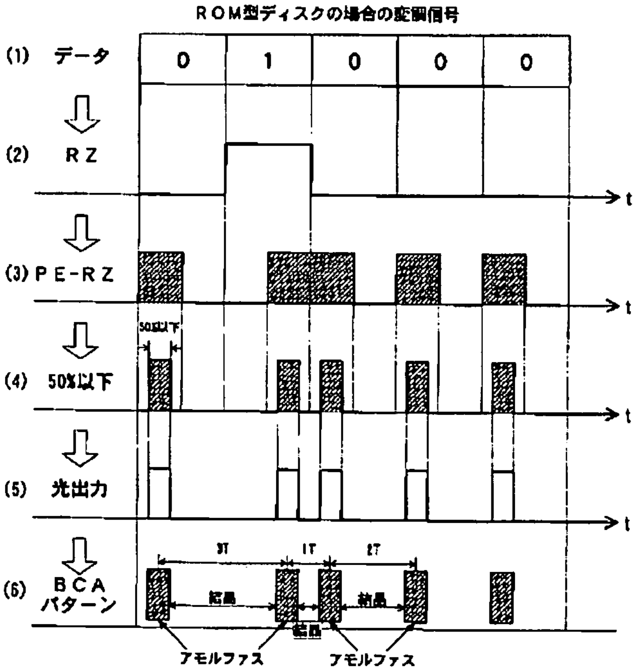
[Drawing 10]



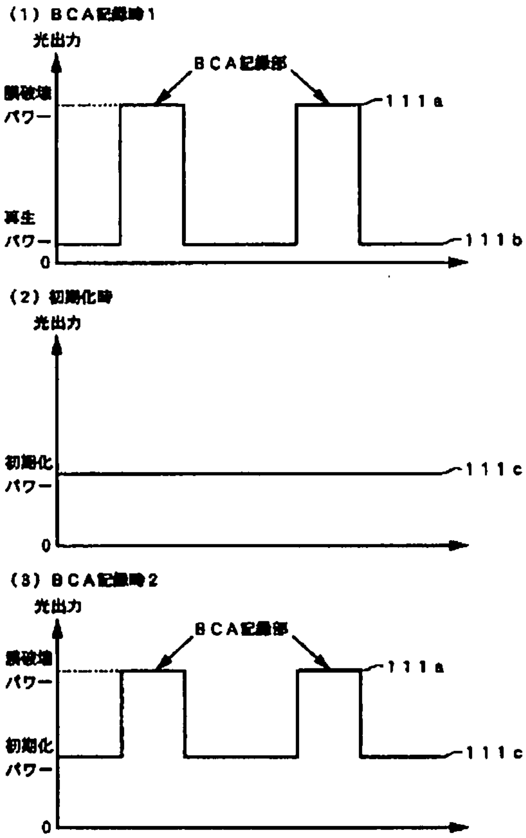
[Drawing 18]



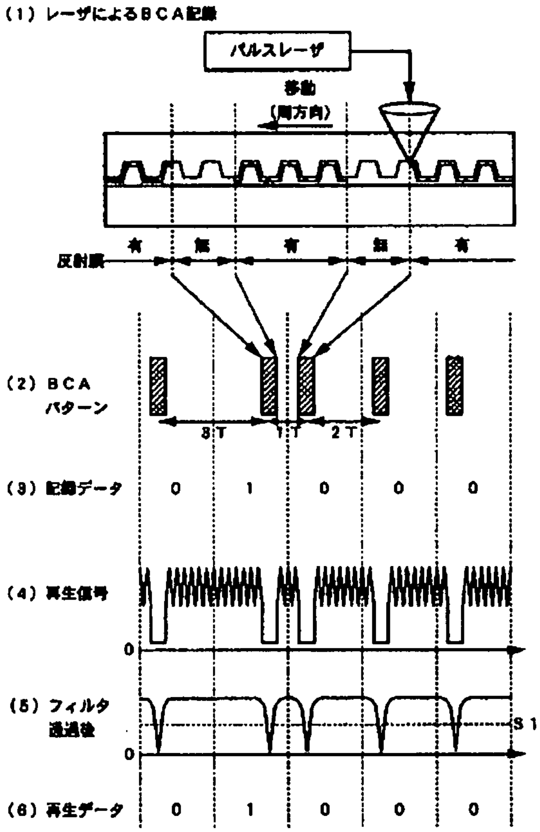
[Drawing 19]



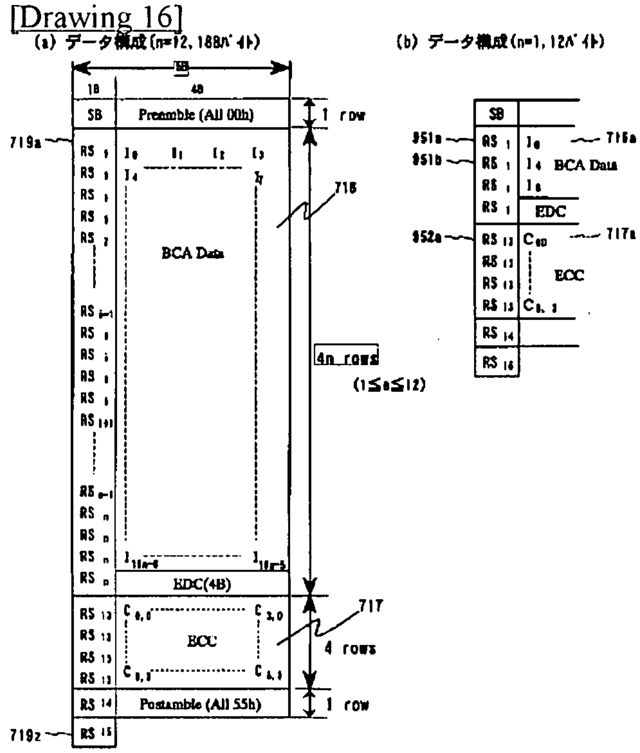
[Drawing 11]



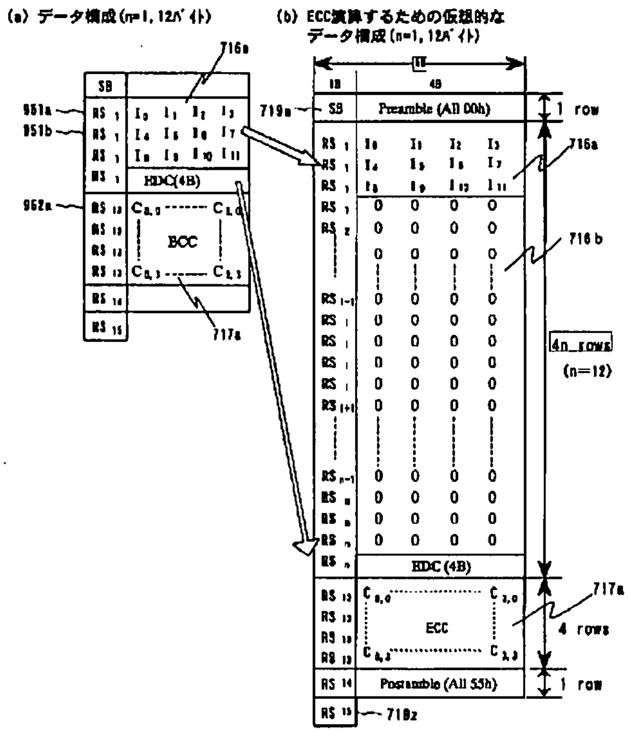
[Drawing 14]



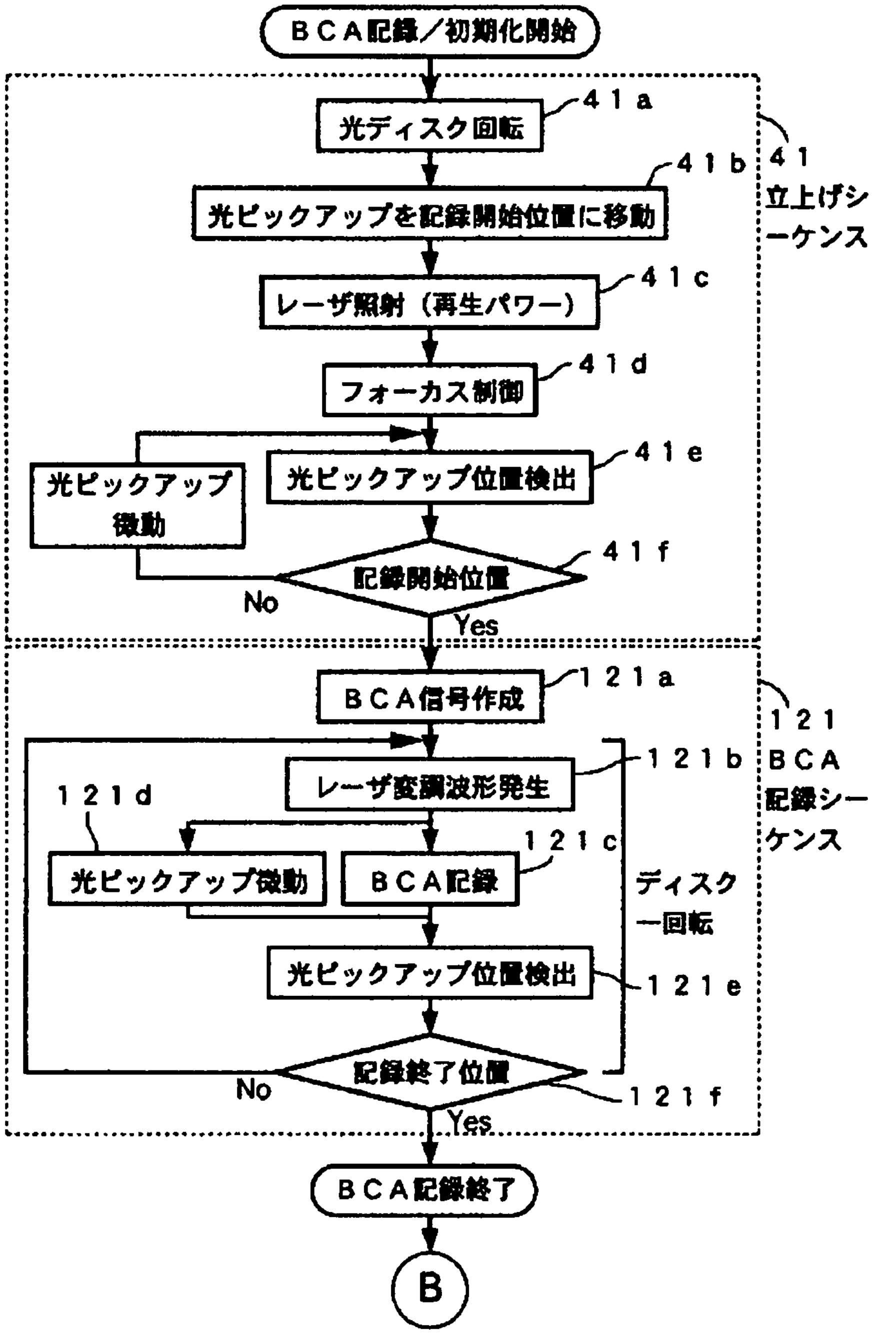
[Drawing 16]



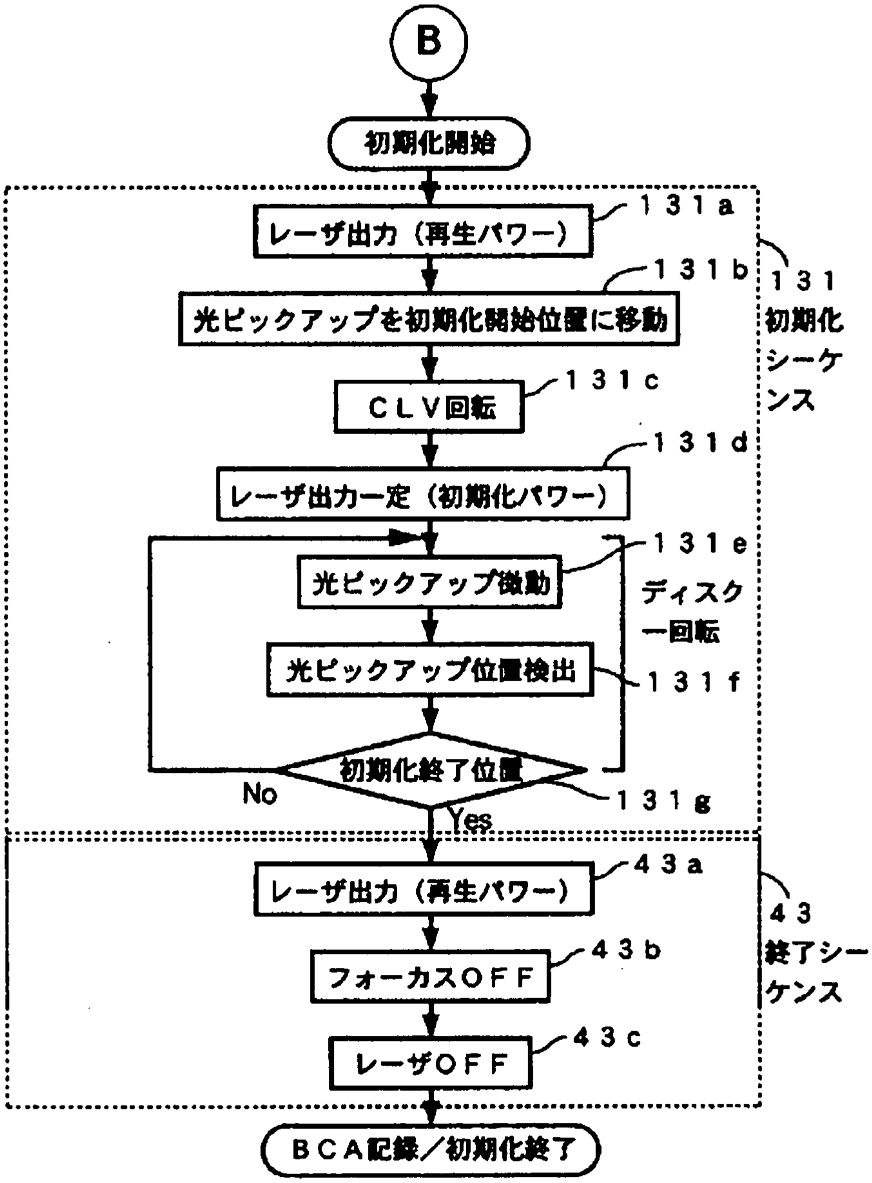
[Drawing 17]


(a) データ構成(n=1, 12バイト)
(b) ECC演算するための仮想的なデータ構成(n=1, 12バイト)
Preamble (All 00h)
EDC(4B)
ECC
Postamble (All 55h)
1 row
4n rows
(n=12)
4 rows
716a
716b
717a
719a
719z
951a
951b
952a

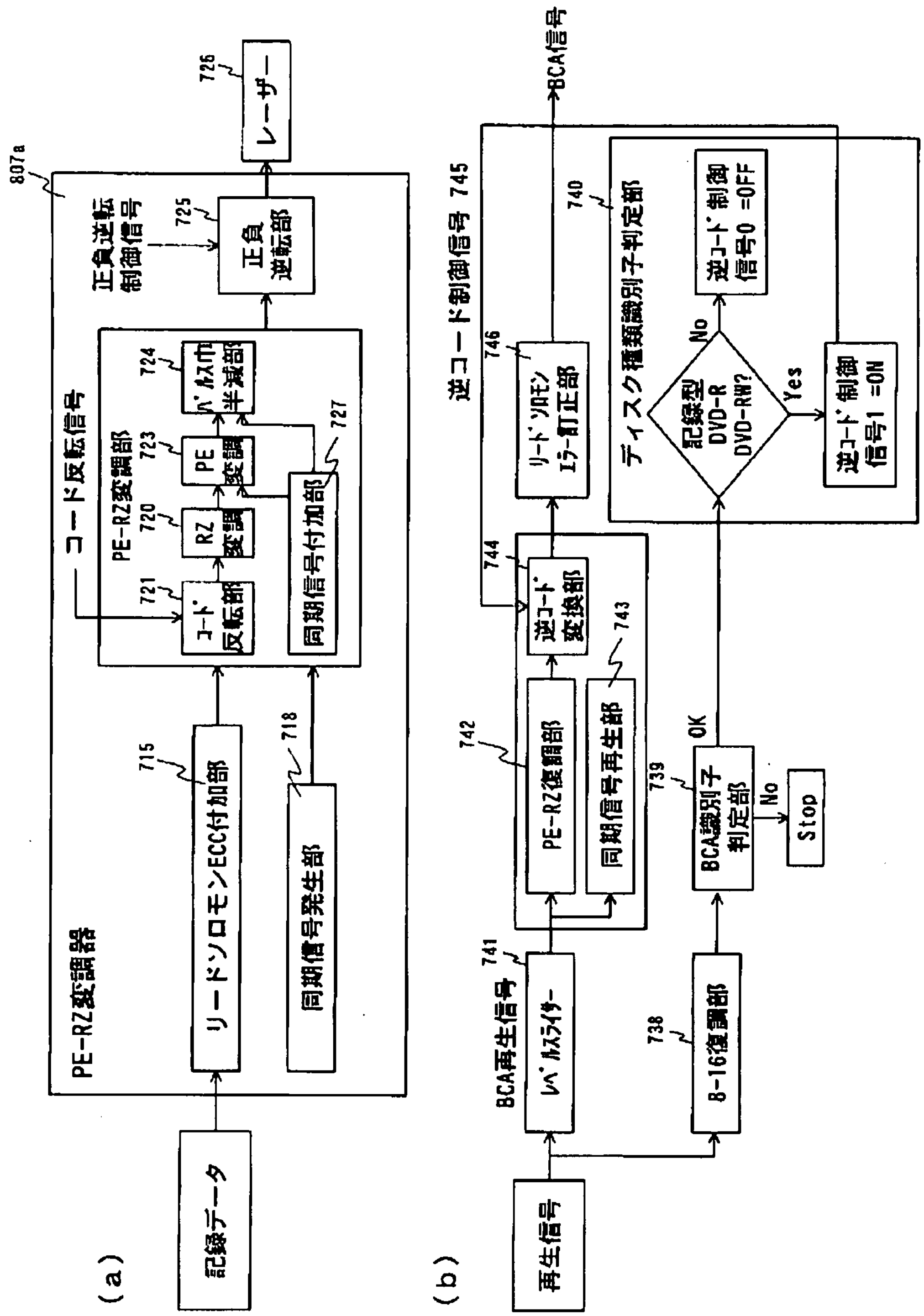
[Drawing 12]


ＢＣＡ記録／初期化開始
光ディスク回転
４１ａ
光ピックアップを記録開始位置に移動
４１ｂ
４１
立上げシーケンス
レーザ照射（再生パワー）
４１ｃ
フォーカス制御
４１ｄ
光ピックアップ微動
光ピックアップ位置検出
４１ｅ
記録開始位置
４１ｆ
No
Yes
ＢＣＡ信号作成
１２１ａ
１２１
ＢＣＡ記録シーケンス
レーザ変調波形発生
１２１ｂ
１２１ｄ
１２１ｃ
光ピックアップ微動
ＢＣＡ記録
ディスク一回転
光ピックアップ位置検出
１２１ｅ
記録終了位置
１２１ｆ
No
Yes
ＢＣＡ記録終了
B

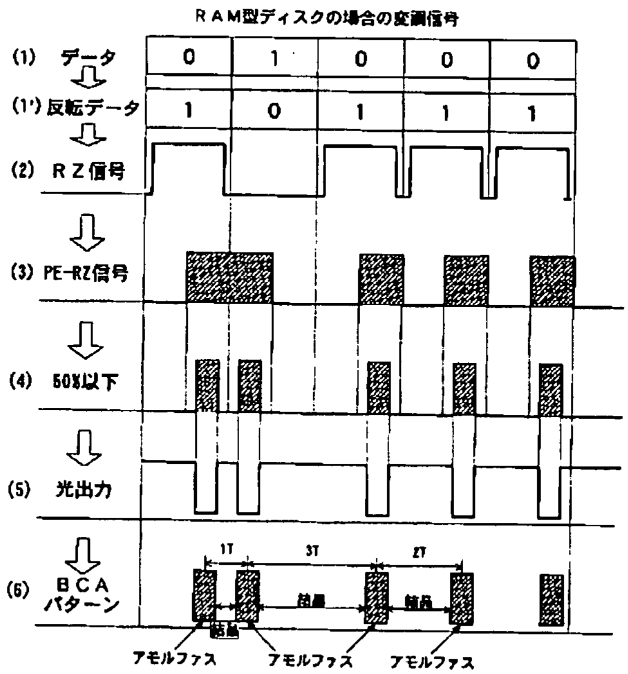
[Drawing 13]


B
初期化開始
レーザ出力（再生パワー）
131a
131
初期化シーケンス
光ピックアップを初期化開始位置に移動
131b
CLV回転
131c
レーザ出力一定（初期化パワー）
131d
光ピックアップ微動
131e
ディスク一回転
光ピックアップ位置検出
131f
初期化終了位置
131g
No
Yes
レーザ出力（再生パワー）
43a
43
終了シーケンス
フォーカスOFF
43b
レーザOFF
43c
BCA記録／初期化終了

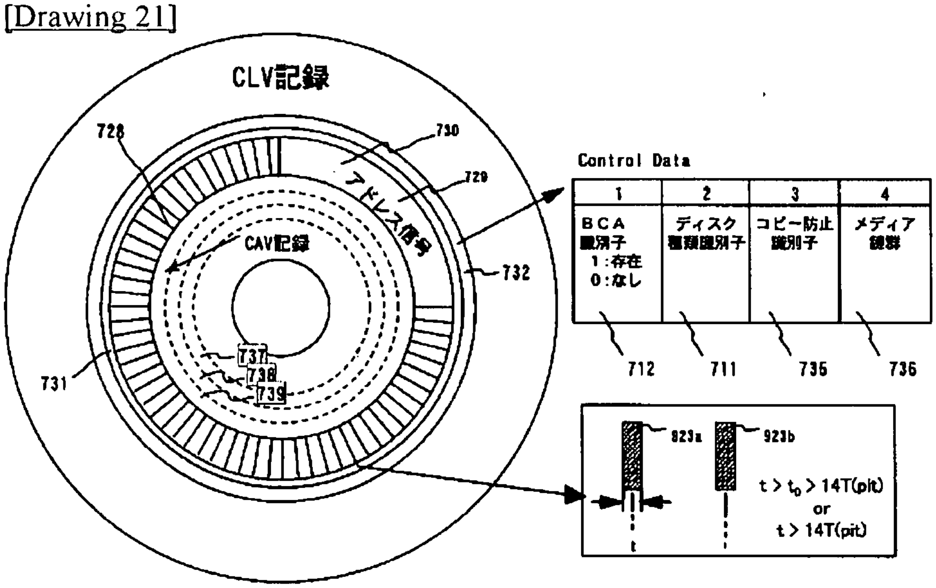
[Drawing 15]


(a)
記録データ
PE-RZ変調器
807a
リードソロモンECC付加部
715
同期信号発生部
718
コード反転信号
PE-RZ変調部
721
コード反転部
720
RZ変調
723
PE変調
724
パルス巾半減部
同期信号付加部
727
正負逆転制御信号
725
正負逆転部
726
レーザー
(b)
再生信号
BCA再生信号
741
レベルスライサー
742
PE-RZ復調部
同期信号再生部
743
744
逆コード変換部
746
リードソロモンエラー訂正部
BCA信号
逆コード制御信号 745
738
8-16復調部
739
BCA識別子判定部
No
Stop
OK
740
ディスク種類識別子判定部
記録型 DVD-R DVD-RW?
Yes
No
逆コード制御信号1 =ON
逆コード制御信号0 =OFF

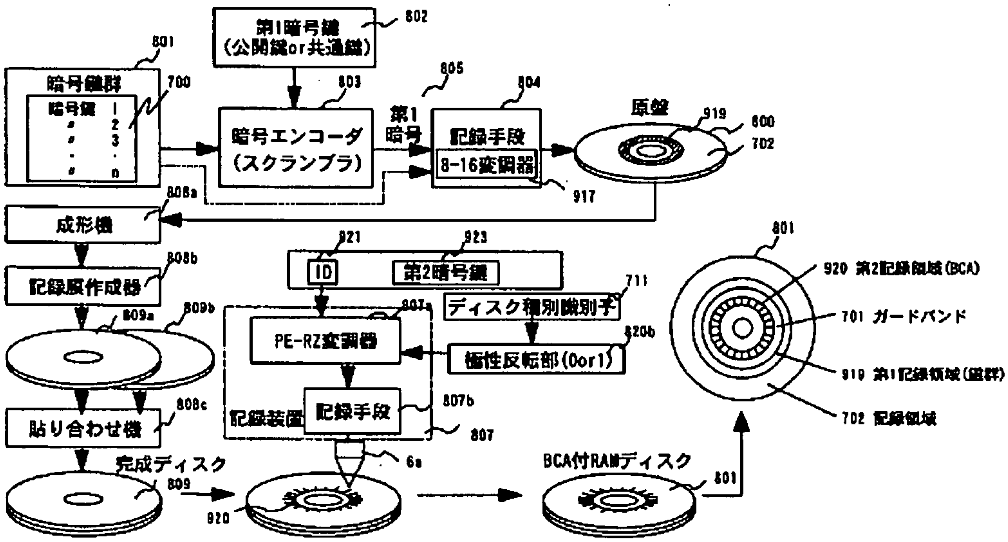
[Drawing 20]



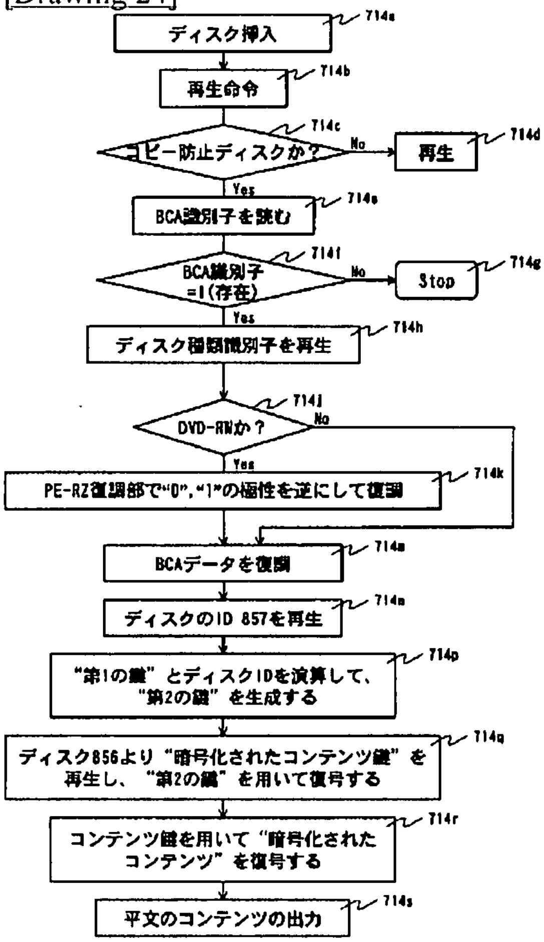
[Drawing 21]



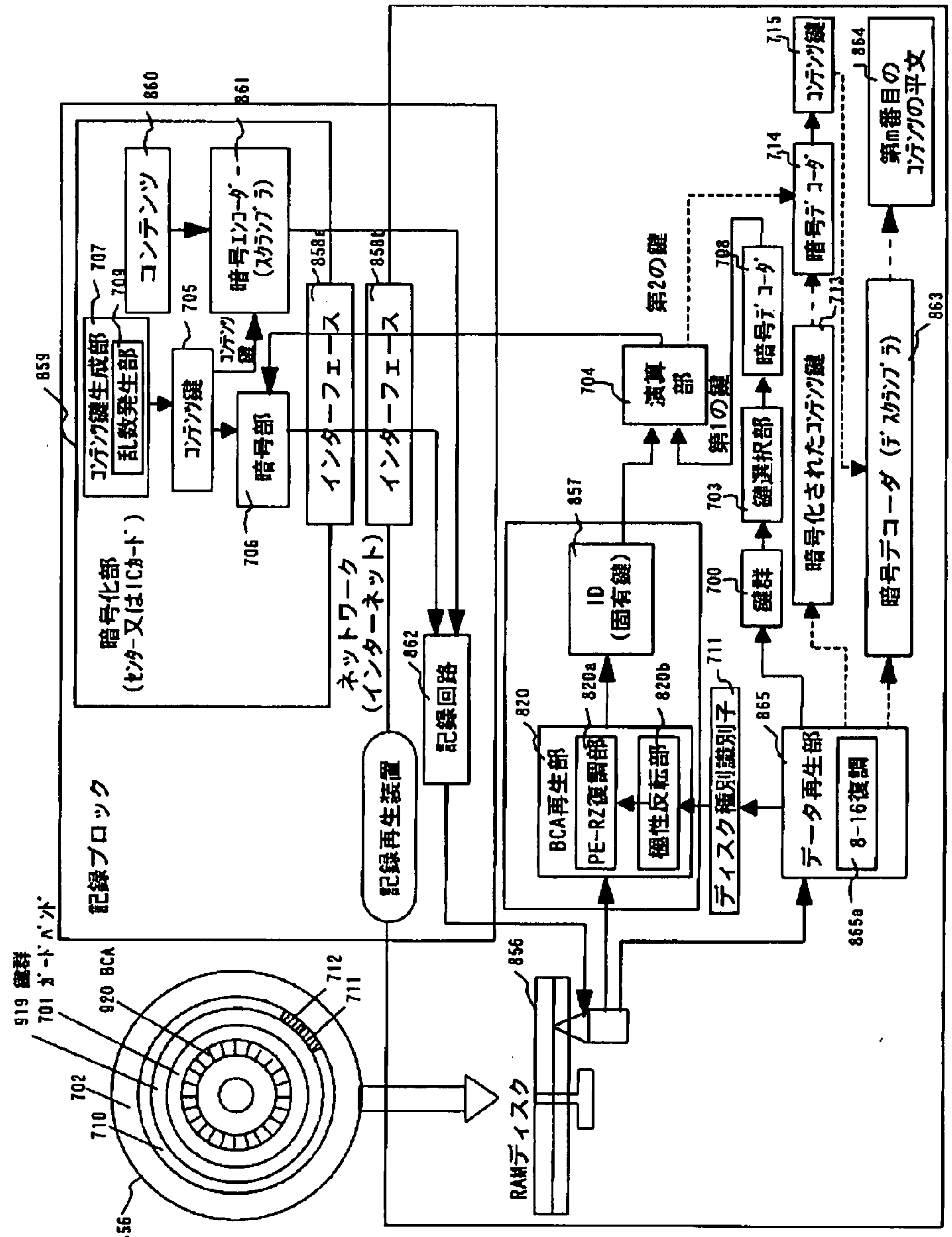
[Drawing 22]



[Drawing 24]



[Drawing 23]



[Translation done.]

Irie Hiroaki et al.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the approach of recording information to an optical recording medium and an optical recording medium.
[0002]
[Description of the Prior Art] In recent years, it is requested increase of amount of information recordable on the optical recording medium of one sheet and that the informational software circulation and the illegal copy prevention technique which were recorded on the optical recording medium progress, and each identification information is recorded to an optical recording medium as the so-called security technique.
[0003] To this request, as identification information to an optical recording medium, the postscript field (it is called "BCA" Burst CuttingArea and the following) which carried out overwrite of the bar code to the pit section of the mold optical recording medium only for playbacks is prepared, and, generally identification information (ID) which is different for every optical recording medium in a BCA field at the time of optical-recording-medium manufacture, and the technique which records a cryptographic key and a decode key if needed are applied, for example.
[0004] As one example which records a signal on the BCA field of the optical recording medium only for these playbacks, there is an approach as shown in drawing 14 . That is, by setting laser by the pattern configuration of BCA and irradiating it in pulse based on the modulating signal modulated according to specific identification information, such as ID, as shown in drawing 14 (1), as shown in drawing 14 (2), package destructive removal of the reflective film of an optical recording medium is carried out at the shape of a stripe. In the part by which destructive removal of the reflective film was carried out, and the left-behind part, as shown in drawing 14 (3), stripe-like BCA is formed on an optical recording medium. If the BCA pattern of the shape of this stripe is reproduced with the optical head of an optical information record regenerative apparatus, since the reflective film has disappeared, as shown in drawing 14 (4), in the BCA section, a modulating signal will serve as an intermittently missing wave. By applying filter processing for this wave-like lack part, as shown in drawing 14 (5), and detecting digital playback data for the business of drawing 14 (6), the identification information currently recorded on the optical recording medium can be obtained. By reading this identification information, it becomes possible to specify optical-recording-medium each.
[0005] The recorded type light information record medium equipped with the information layer which can record an information signal on the other hand, or the rewritten type light information record medium equipped with the information layer which can rewrite an information signal freely is also developed, and versatility is increased. In this recorded type light information record medium and a rewritten type light information record medium (henceforth an "optical disk" also including a record mold and a rewriting mold), since information can record freely, importance is increasingly attached to the handling to the security to the information recorded on the optical disk.
[0006]

[Problem(s) to be Solved by the Invention] However, if it is going to apply the BCA pattern formation approach which carries out destructive removal of the reflecting layer in the mold optical recording medium only for playbacks to an optical disk, a technical problem as shown below will occur.
[0007] First, since informational existence is detected by optical change of the information layer itself, even if it is the configuration of the optical disk temporarily equipped with the reflecting layer, an optical difference is hardly undetectable [with the information layer containing which optical activity ingredient of coloring matter, a magnetic material, or a phase change mold record ingredient] by the BCA pattern which vanished only the reflecting layer. Therefore, it is necessary to occur change which can detect optically the information layer itself which can record an information signal on an optical disk.
[0008] Next, even if it is going to adopt the approach of imitating the BCA pattern formation approach in the mold optical recording medium only for playbacks, irradiating in pulse the laser set by the BCA pattern configuration, and carrying out destructive removal of the information layer of an optical disk Since cascade screens, such as an enhancing layer, a hard layer, an interlayer, and a dielectric layer, are formed in the one side side of an information layer at least, Destructive removal only of the information layer containing an optical-activity ingredient cannot be carried out alternatively. The droplet of an information layer and/or a cascade screen occurs the information layer near the boundary section of a BCA pattern and/or exfoliation of a cascade screen, and inside a BCA pattern, distortion arises in formation of the BCA pattern section, and the technical problem from which a noise mixes in the signal which detects BCA, and sufficient BCA signal is not acquired occurs.
[0009] Moreover, the defect resulting from the information layer near the BCA pattern and/or exfoliation of a cascade screen does not stop at a subinformation field, but attains to even the information layer and/or cascade screen of the main information field, and a fatal technical problem generates it for a record mold optical recording medium.
[0010] Especially, at the phase-change optical disk, information is recorded by making it cool, after irradiating the light beam which carried out pulse modulation according to the information signal at an information layer and carrying out melting of the information layer, and forming a record mark. Thus, since melting follows on an information layer, when the optical-activity ingredient of the information layer of a melting condition pulsates or flows, the configuration which equips a recording characteristic with the ingredient which is excellent in a heat mechanical characteristic, and which is generally called a dielectric in contact with an information layer in order [ingredient / which constitutes an information layer] to control the phenomenon which causes change is adopted. Furthermore, in the rewriting mold optical disk from which a phase state changes reversibly, the configuration which pinches an information layer with a dielectric is taken.
[0011] The cascade screen which has the operation which controls phenomena, such as pulsation at the time of melting of the optical-activity ingredient of this information layer and/or a flow If high energy is forcibly irradiated in order to become the work which prevents BCA pattern formation on the occasion of BCA pattern formation and to form a BCA pattern There is no location which absorbs impacts, such as ebullition of an optical-activity ingredient or evaporation. Exfoliation of a cascade screen and/or an information layer, The droplet of air bubbles, a cave-in, an information layer, and/or a cascade screen ingredient occurs in the interior of a BCA pattern, and a periphery, a defect spreads even in the information layer of not only a subinformation field but the main information field, and the generating factor of the fatal defect which becomes unrecordable increases.
[0012] Thus, it is difficult to record at least the BCA pattern which can be detected correctly on a recordable mold optical disk, and the trouble accompanying formation of a BCA pattern is mentioned to the main factors of the cause which the manufacturing cost of an optical disk goes up.
[0013] This invention aims at offer of the optical disk in which the approach and BCA pattern which record BCA stably were formed, to a record mold optical disk.
[0014]
[Means for Solving the Problem] In order to attain the above-mentioned purpose, the record approach of the optical recording medium of this invention The main information field which can record an

information signal, and said information signal are divided and equipped with the subinformation field which records the subinformation from which a class differs in the direction of 1 principal plane of a substrate. The lead-in groove area of said subinformation field is also equipped with the information layer which records said information signal in said main information field. The optical recording medium which records the medium identification information which identifies said medium optically on said information layer of said lead-in groove area is used. After scanning the light beam which piles up said a part of spot in the direction of vertical scanning of the main scanning direction of the hoop direction of said spot, and the direction of a path of said spot, irradiating the spot of a light beam and recording said medium identification information on an information layer, It is characterized by performing said information signal record by the light beam modulation technique of said medium identification information record, and different modulation technique.

[0015] After the record approach of said optical recording medium performs medium identification information record, it is desirable to carry out the phase change of said main information field to a crystallized state succeedingly for initialization.

[0016] As for the record approach of said optical recording medium, it is desirable to reduce the light beam reinforcement which irradiates said information layer for record of said medium identification information rather than the light beam reinforcement which irradiates said information layers other than said medium identification information.

[0017] As for the record approach of said optical recording medium, it is desirable that the component of said information layer of said main information field and the component of said information layer of said lead-in groove area are the same.

[0018] The optical recording medium of the record approach of said optical recording medium is a disk type-like medium, and, as for a subinformation field, it is desirable to exist in the location which met the inner skin of said main information field of said disk type-like medium.

[0019] As for the record approach of said optical recording medium, it is desirable that lead-in groove area exists in the range of 22.3mm or more 23.5mm or less from the core of a disk type-like medium.

[0020] As for the record approach of said optical recording medium, it is desirable to record on a subinformation field by the postscript field (Burst CuttingArea) which carried out overwrite to said information layer of the pit formation field in said lead-in groove area so that it may leave an amorphous condition to lead-in groove area in the shape of a stripe or may leave a crystallized state in the shape of a stripe.

[0021]

[Embodiment of the Invention] In order to equip the optical recording medium of this invention with the information layer which can record an information signal over the main information field and a subinformation field and to have the configuration which recorded the subinformation recorded on the information layer of a subinformation field, without changing the configuration of an information layer, In the case of medium identification information pattern formation like a BCA pattern, the defect which the information layer of a BCA pattern boundary part cannot recover [of exfoliation or a hole] occurs especially. A technical problem fatal to the record mold optical recording medium that originate in the defect concerned and the information layer of the main information field also becomes unrecordable is solvable. What is necessary is to mention optical-activity ingredients, such as coloring matter, a magnetic material, and a phase change ingredient, for example, to choose suitably the energy intensity of the light sources, such as a laser beam, and/or a heat source etc., and just to record it as a gestalt of the information layer of the subinformation field which records subinformation without change of a configuration, corresponding to an optical-activity ingredient. In addition, with form status change-ization of the information layer as used in the field of this invention, a very minute change of the formation of a form status change of the information layer accompanying the atomic arrangement change for example, between a crystal / crystal, between amorphous and a crystal, etc., the formation of a form status change of the information layer accompanying the chemical change of the ingredient which constitutes an information layer, etc. is not included.

[0022] If the configuration which contains phase change die materials in the information layer of the

main information field is adopted, the phase state of medium identification information recorded, for example on the information layer of a subinformation field and the phase state of the information layer of the main information field can be changed independently, and the phase state of the information layer of each field can be controlled, or the record part of medium identification information can be recorded with a different phase from the phase state of the information layer of the main information field.
[0023] If the main component of the information layer of the main information field and the main component of the information layer of a subinformation field adopt the same configuration, since an optical recording medium can be created without changing the ingredient configuration of the information layer of a subinformation field, and the information layer of the main information field, an optical recording medium can be offered cheaply.
[0024] Moreover, while the part on which the information signal is recorded is easily discriminable or it records the part and information signal on which medium identification information is recorded with the record regenerative apparatus if the configuration which performs said information signal record process by the light beam modulation technique of said medium identification information record process and different modulation technique is adopted after performing said medium identification information record process, the medium information on a medium information signal part can be recognized exactly.

[0025] Furthermore, after said medium identification information record process and said phase-number conversion process, when a configuration including the process which records an information signal on the information layer of said main information field is adopted and a magneto-optic-recording ingredient or a phase change record ingredient is included in an information layer, since record, playback, and/or elimination are made in the information layer of the main information field, it is desirable. in addition, you may carry out to coincidence so that a medium identification information record process and a phase-number conversion process may be mentioned later, and the back medium discernment division record process of for example, a phase-number conversion process is performed -- it is -- it is -- carrying out as a separate process like the reverse order responds at the time of the need, and it can choose.
[0026] If the configuration which falls rather than the light beam reinforcement which irradiates the light beam reinforcement which irradiates medium identification information at an information layer at information layers other than medium identification information is adopted For example, when the ingredient which carries out a phase change between amorphous and a crystal is included in an information layer It is recordable on an information layer as medium identification information with the condition (an amorphous condition accounts for the main rate) that membranes were formed, and except a medium identification information part, since phase-number conversion can be carried out to a crystallized state, medium identification information is recordable with usual initial crystallization equipment.
[0027] Moreover, it can respond by the scan to which a spot laps in the main scanning direction of the hoop direction of the spot which irradiates a light beam and records medium identification information on an information layer, and the direction of vertical scanning of the direction of a path of this spot in a main scanning direction and the direction of vertical scanning using the optical beam spot narrower than the width of face and path lay length of a hoop direction of a medium recognition signal in order to perform the scan which piles up a part of spot.
[0028] If the relative-displacement rate of the main scanning direction of a spot and an optical disk is controlled especially proper, it is also possible to make an information layer into an opening like the medium identification information which the information layer of a medium identification information part can be made unevenly distributed with a melting condition, and is formed in the reflecting layer in the mold optical recording medium only for playbacks. This opening-ized medium identification information part is liquefied, and since an information layer is unevenly distributed, it can also cancel technical problems, such as exfoliation of the information layer by the impact which originates in generating of the droplet of the ingredient of an information layer, and/or the ingredient of a cascade screen etc., evaporation, etc. compared with the approach of irradiating the light beam of the magnitude of a medium identification information part, and creating an opening, and/or a cascade screen. In

addition, in order to be dependent on the ingredient of the information layer of an optical disk, and/or the surrounding configuration and surrounding ingredient of a cascade screen of an information layer, the width of face of the main scanning direction of the light beam which irradiates a medium identification information part, and the direction of vertical scanning, the reinforcement of a light beam, and/or the relative velocity of a light beam and an optical disk are chosen suitably, and are used. Moreover, although it also has the effectiveness that the alteration of the medium identification information by the user can be prevented, for example, with the desirable configuration which makes a medium identification information part an opening, the configuration of the information layer of a medium identification information part of changing with the configuration of other information layers is natural in this case.
[0029] Furthermore, if the direction near the after [the hand of cut of the subinformation on an optical recording medium] flank part edge side adopts a configuration with many amounts in which the information layer of a subinformation field is unevenly distributed [near the before / the subinformation on a hand of cut / side edge side],-izing of the medium identification information part can be carried out [opening], and the same optical property as the medium identification information of the mold optical recording medium only for playbacks will be obtained.
[0030] In this invention, an optical recording medium is a disk type-like medium and, as for a subinformation field, it is desirable to make it exist in the location which met the inner skin of the lead-in groove area of said disk type-like medium. It is because it is most suitable for said location recording medium identification information.
[0031] Moreover, in this invention, in an optical disk with a diameter of about 120mm, it is desirable [a subinformation field] to exist in the range of 22.3mm or more 23.5mm or less from the core of a disk so that an optical pickup may not be restricted structural from a motor and an actuator and the main information may not be affected, including the range which can carry out movable [of the optical pickup]. It is because it is most suitable for said location recording medium identification information similarly.
[0032] Moreover, it is desirable to record subinformation by the postscript field (Burst Cutting Area) which carried out overwrite so that it may leave an amorphous condition to a subinformation field in the shape of a stripe or may leave a crystallized state in the shape of a stripe. When leaving an amorphous condition to a subinformation field in the shape of a stripe, it is desirable to carry out the phase change of the main information field to a crystallized state, and to initialize it succeedingly. When leaving a crystallized state to a subinformation field in the shape of a stripe, the main information field is convenient when using the record film of initialization needlessness (AZUDEPO (as-depo)). Although the AZUDEPO film is crystallized from the beginning, it can be made to make it amorphous by irradiating laser power so that it may become an elevated temperature momentarily to extent which record film does not destroy.
[0033] In the above, there are the chalcogenide which uses Te and Se as the base, for example, GeSbTe, GeTe, etc. as record film which is made to carry out the phase change of the main information field to a crystallized state, and initializes it. Moreover, it can form by the approach of for example making GeSbTe of said chalcogenide depositing slowly, using the gaseous-phase thin film depositing methods, such as a vacuum deposition method, as record film of initialization needlessness (AZUDEPO (as-depo)).
[0034] In the above, phase changes are an amorphous condition and a crystallized state, and it is desirable that the reflection factor of the light of a crystallized state is high 10% or more as compared with the reflection factor of the light of an amorphous condition. It is because recording information can distinguish certainly if reflection factor ratios differ 10%.
[0035] Moreover, it is desirable for said optical recording medium to have a disc-like configuration, to scan said light beam equipped with the superposition part which piles up said a part of spot in the direction of vertical scanning of the main scanning direction of the hoop direction of said spot and the direction of a path of said spot when irradiating the spot of a light beam at an information layer and recording said medium identification information, and to make said superposition part into recording

information. The recorded BCA signal is reproducible using the light beam which can form a BCA signal that there is no break in radial, and reproduces the main information by this approach.
[0036] Hereafter, one example of invention is explained, referring to a drawing. In addition, although the following examples explain the case of the rewriting mold phase-change optical disk which carries out a phase change reversibly between amorphous and a crystal as an optical recording medium, they are not limited to a rewriting mold phase-change optical disk as an optical recording medium applicable to this invention, and can apply the information layer ingredient of pigment system ingredients, such as the so-called optical magnetic adjusters, such as the rare earth and a transition-metals alloy, cyanine dye, and phthalocyanine system coloring matter, etc. in which the so-called record is possible. Moreover, the ingredient which carries out a phase change between amorphous and a crystal or between a crystal / crystal is mentioned, as phase change die materials, conventionally, since it is a well-known ingredient, it omits for details, but it is applicable even if it is the ingredient which carries out the phase change also of the ingredient which carries out a phase change reversibly only to one of the two.
[0037] (Example 1) Drawing 1 is the block diagram showing an example of the equipment configuration which records medium identification information in an optical disk, and explains the case of BCA as medium identification information. The recording device of this drawing The laser mechanical component 5 which drives the light source of the optical pickup 4 which condenses the light beam generated from the light sources, such as the spindle motor 2 and the roll control section 3 which rotate an optical disk 1, and a laser beam, and an optical pickup 4, and the subinformation recorded on an optical disk are modulated. A BCA signal The BCA signal generation section 6 and the BCA signal to create On a basis, a laser modulated wave form The light which carried out outgoing radiation from the wave setting section 7 which operates orthopedically, and an optical pickup 4 The focal control section 8 for condensing on an optical disk, the delivery motor 9 to which an optical pickup 4 is moved and the delivery motor control section 10, the position transducer 11 that detects the location of an optical pickup 4, the laser mechanical component 5, the roll control section 3, the focal control section 8, and the delivery motor control section 10 It consists of system control systems 12 controlled synthetically.
[0038] Drawing 2 is the important section cross-section block diagram showing the phase-change optical disk structure of an example of an optical disk applicable to this invention. As shown in drawing 2 , in contact with the record film 26 which consists of a dielectric layer 22, a recording layer 23 (the so-called information layer), a dielectric layer 24, and a reflecting layer 25, and record film 26, ultraviolet-rays hardening resin etc. is applied as a resin protective coat 27 on one principal plane of the transparence substrate 21. As a recording layer 23, it has the phase change mold recording layer, and the phase state of a recording layer can be changed using an optical means, and information record can be performed. It is stuck through a glue line 28 by making these two substrates into a pair, and is finished as an optical disk of one sheet. In addition, even if it is the optical disk made the symmetry configuration through the glue line 28, of course, it is applicable. the record film 26 in the example shown in drawing 2 -- to the dielectric layer 22, membranes were formed by Zn-SiO2 (30nm of thickness) to GeTeSb (20nm of thickness), and a dielectric layer 24, and aluminum alloy (90nm of thickness) was formed by the sputtering method at the reflecting layer 25 at Zn-SiO2 (120nm of thickness), and a recording layer 23.
[0039] Drawing 3 is the plan of the phase-change optical disk shown in drawing 2 . As shown in this drawing, the main information record section 31 and the subinformation record section 32 exist in an optical disk 1. The main information is record and information reproduced or eliminated in an optical record regenerative apparatus, users are things, such as ID (identification information) from which subinformation differs for every disk, a cryptographic key, and a decode key, and it is recorded at the time of optical disk manufacture. Hereafter, the example of this invention explains based on BCA record as subinformation record. In addition, the pit section which formed the positional information about the main information etc. in the subinformation field in the pit in addition to **** is also contained, and, generally BCA is recorded in piles on a part of recording layer of this pit formation field. The subinformation record section 32 exists in the range of 22.3mm or more 23.5mm or less from the core of an optical disk 1. This field is also called lead-in groove area. Moreover, in the example shown in

drawing 3 , when the subinformation record section 32 was recorded using laser with a wavelength of 810nm and the subinformation record section 32 was reproduced using laser with a wavelength of 660nm, the rate of a light reflex of the part of an amorphous condition of the rate of a light reflex of the part of a crystallized state was 2.5% 16%.

[0040] Drawing 4 shows the flow chart which records BCA on the phase-change optical disk of this invention. The procedure which records BCA is explained using drawing 4 . The procedure which records BCA is roughly divided into three sequences, and consists of the starting sequence 41, a BCA record sequence 42, and a termination sequence 43.

[0041] It rises first and a sequence 41 is explained. By step 41a, a spindle motor 2 is driven by the roll control section 3 based on the directions from the system control system 12, and an optical disk 1 is rotated at a fixed rotational frequency (CAV condition). By step 41b, the delivery motor 9 controlled by the delivery motor control section 10 rotates the screw 13 which supports an optical pickup 4, moves an optical pickup 4 in the direction of a path of an optical disk 1, and is moved to a subinformation recording start location. By step 41c, the laser mechanical component 5 drives the high power laser 14, such as semiconductor laser currently used as the light source, based on the directions from the system control system 12. The light beam which carried out outgoing radiation from laser 14 lets the optical system of an optical pickup 4, and the last objective lens 15 pass, and is irradiated by the optical disk. The optical output by which outgoing radiation is carried out from laser 14 at this time is an output of extent which does not crystallize the recording layer 23 of an optical disk 1. Focal control is performed and the light beam which carried out outgoing radiation from laser 14 is made to condense in the shape of [of an optical disk 1] record film by step 41d. The reflected light from an optical disk 1 is detected by the photodetector 16, and is outputted as an electrical signal from a photodetector 16. This output signal is amplified by pre amplifier 17, and is inputted into the focal control section 8. According to the input signal from a photodetector, the focal control section 8 drives the voice coil 18 of an optical pickup 4, and it controls it by making the perpendicular direction of an optical disk side move an objective lens 15 slightly so that a light beam condenses on record film. By step 41e, a position transducer 11 detects the location of an optical pickup, and transmits positional information to the system control system 12. While detecting that the system control system 12 has the exposure location of a light beam in a subinformation recording start location based on the acquired positional information and outputting a subinformation record signal to the wave setting section 7 by step 41f, the BCA record sequence 42 is started. When there is no exposure location of a light beam in a subinformation recording start location, the system control system 12 is based on the delivery motor control section 10, and delivery and the delivery motor control section 10 are based on this signal in a signal, drive the delivery motor 9, an optical pickup 4 is made to move slightly, and it is made to move to a subinformation recording start location. It returns to step 41e again after this.

[0042] Next, the BCA record sequence 42 is explained. By step 42a, as shown in drawing 5 (1), record data (subinformation), such as identification information recorded on an optical disk 1, are coded, and a BCA pattern (record signal) as shown in drawing 5 (2) is created. In step 42b, the wave setting section 7 generates a laser modulated wave form based on a BCA pattern. The wave setting section 7 operates orthopedically the laser modulated wave form where the BCA signal sent from the BCA signal generation section 6 and the BCA signal as indicate the one-revolution pulse signal from the roll control section 3 to be timing to drawing 5 (3) based on the rotational frequency from the system control system 12 were reversed. Moreover, the wave setting section 7 outputs a laser modulated wave form, when the subinformation record signal from the system control system 12 is received, and when not receiving a subinformation record signal, it performs bias outputs, such as a laser output lower than a subinformation record signal, for example, a playback output etc. While an optical disk 1 rotates one time, step 42c and step 42d are performed by coincidence. In step 42c, BCA record is performed on an optical disk 1. The laser mechanical component 5 performs a laser drive based on the laser output value specified from the system control system 12, and the laser modulated wave form from the wave setting section 7, and a laser beam is outputted like drawing 5 (4). In the optical output in drawing 5 (4), output 51a is a laser output from which energy required to crystallize the record film 26 of an optical disk 1 is

obtained, and output 51b is the output (for example, playback power) of extent which does not crystallize the record film 26 of an optical disk 1.
[0043] Next, the optical output shown in drawing 5 (4) explains BCA record of a up to [an optical disk 1] using drawing 6 . It is condensed on the record film 26 of an optical disk 1, and a light beam 61 moves relatively by rotating an optical disk 1 in an optical disk 1 top (the arrow head of this drawing shows the migration direction of an optical disk 1). Based on the laser modulated wave form generated by the wave setting section 7, the laser mechanical component 5 modulates the output reinforcement of a laser beam. By crystallizing record film 26, when an optical output is 51a, and leaving with the condition (mainly amorphous condition) of having formed record film 26 when an optical output was 51b, the intermission of the crystallization is carried out and BCA is recorded.
[0044] In step 42d, while an optical disk 1 makes one revolution, an optical pickup 4 is moved in the direction of a path of an optical disk 1. The procedure which records a BCA pattern is explained using drawing 7 , moving an optical pickup. The condensing spot 71 condensed on the record film 26 of an optical disk 1 is carrying out the long configuration to the direction of a path of an optical disk 1. The movement magnitude 72 of the optical pickup 4 per one spindle motor revolution is path lay length 71a of the condensing spot 71, equivalent, or the magnitude below equivalent. With the directions from the system control system 12, the delivery motor control section 10 makes the delivery motor 9 drive, and it moves an optical pickup 4 so that it may become a fixed rate synchronizing with rotation of a spindle motor 2. By modulating a laser beam on the basis of a one-revolution pulse, as step 42c described to coincidence, a stripe-like BCA pattern is formed in the subinformation record section of an optical disk 1 from the principle shown by drawing 6 .
[0045] By step 42e, a position transducer 11 detects the location of an optical pickup, and transmits positional information to the system control system 12. While detecting that the system control system 12 has the exposure location of a light beam in a subinformation record section based on the acquired positional information and outputting a subinformation record signal to the wave setting section 7 by step 42f, it returns to step 42b. When the exposure location of a light beam comes outside a subinformation record section, it moves to the termination sequence 43.
[0046] Next, the termination sequence 43 is explained. The system control system 12 returns a signal to the laser mechanical component 5, and returns delivery and a laser output to playback power by step 43a. By step 43b, the system control system 12 suspends delivery and focal control for a signal to the focal control section 8. The system control system 12 makes a signal the laser mechanical component 5, and makes delivery and a laser output zero by step 43c.
[0047] By the above approach, BCA is recordable on the subinformation record section of the optical disk 1 shown in drawing 3 by leaving an amorphous condition in the shape of a stripe.
[0048] The case where the phase-change optical disk which recorded BCA is played in the usual optical information record regenerative apparatus by the above-mentioned approach to drawing 5 is shown. The BCA pattern recorded on an optical disk at this time is formed in the shape of [like drawing 5 (5)] a stripe. If this stripe is reproduced with the optical head of the usual optical information record regenerative apparatus, since a reflection factor falls compared with a crystallized state, the part of an amorphous condition will be reproduced like drawing 5 (6). This regenerative signal turns into a BCA regenerative signal in the mold optical recording medium only for playbacks of the conventional example shown by drawing 14 (4), and the almost same regenerative signal. By making a low pass filter pass this regenerative signal, a signal like drawing 5 (7) is acquired and playback data like drawing 5 (8) are obtained by carrying out a level slice.
[0049] In addition, although generation of the laser modulated wave form in the wave setting section was based on the one-revolution pulse signal from a spindle motor 2 here, a rotary encoder is further prepared in a spindle motor 2, and there is a method of setting up the generating timing of an intermittent pulse on the basis of the angle-of-rotation signal of the optical disk 1 detected by this rotary encoder. According to this approach, the error of the BCA record location by rotation fluctuation of a spindle motor 2 etc. can be reduced, and the precision of a BCA record location can be raised further.
[0050] Moreover, although explained in the condition of making rotation of an optical disk 1 into a fixed

rotational frequency (CAV) here, there is the approach of making rotation of an optical disk 1 a constant linear velocity (CLV) by preparing a rotary encoder in a spindle motor 2, and being based on the angle-of-rotation signal of the optical disk 1 detected by this rotary encoder. Since according to this approach the laser output for crystallizing record film can be carried out to regularity and the crystallization time difference by linear-velocity change is lost, a stable crystallized state can be acquired.

[0051] Moreover, although explained using a square wave form like drawing 6 as a laser output for carrying out the intermission of the crystallization here, there is also the approach of using a laser output as multi-pulse shape. According to this approach, it is controllable to become the heating value which needs the heating value given to a disk side by the laser beam to crystallize only a crystallization field, and since it can stop that a crystallization field spreads with remaining heat, the optimal BCA record condition can be acquired.

[0052] (Example 2) Drawing 8 is the block diagram showing the configuration of the BCA recording apparatus which can also perform initialization processing of an optical disk continuously while recording BCA on the optical disk of this invention. This recording device has the description that BCA record and initialization can be performed continuously, to an optical disk 1 by adding the change-over machine 83 which switches each control system according to the BCA record control system 81, the initialization control system 82, and a situation into a system control system to the BCA recording device shown in drawing 1 . When the exposure location of a light beam is in a subinformation record section with the signal from a position transducer 11, system control of the change-over machine 83 which switches this BCA record and initialization is carried out according to a BCA record control system, and when it is outside a subinformation record section, system control of it is carried out according to an initialization control system.

[0053] After performing BCA record for concrete actuation of this equipment in the state of CAV as an example using the flow chart of drawing 9 and drawing 10 , the case where it initializes in the state of CLV is shown below. The procedure of this equipment is roughly divided into four sequences, and consists of the starting sequence 41, the BCA record sequence 42, an initialization sequence 91, and a termination sequence 43. In this example, radius location 34a [in / in a subinformation recording start location / drawing 3], radius location 34b [in / in a subinformation record termination location / drawing 3], and an initialization starting position set radius location 34b in drawing 3 , and an initialization termination location to radius location 34c in drawing 3 .

[0054] It rises first and a sequence 41 is explained. By step 41a, a spindle motor 2 is driven by the roll control section 3 based on the directions from the system control system 12, and an optical disk 1 is rotated at a fixed rotational frequency (CAV condition). By step 41b, the delivery motor 9 rotates the screw 13 which supports an optical pickup 4, moves an optical pickup 4 in the direction of a path of an optical disk 1, and is moved to a subinformation recording start location. By step 41c, the laser mechanical component 5 drives laser 14 based on the directions from the system control system 12. The light beam which carried out outgoing radiation from laser 14 lets the optical system of an optical pickup 4, and the last objective lens 15 pass, and is irradiated by the optical disk. The optical output by which outgoing radiation is carried out from laser 14 at this time is an output of extent which does not crystallize the recording layer 23 of an optical disk 1. Focal control is performed and the light beam which carried out outgoing radiation from laser 14 is made to condense in the shape of [of an optical disk 1] record film by step 41d. By step 41e, a position transducer 11 detects the location of an optical pickup, and transmits positional information to the system control system 12. While detecting that the system control system 12 has the exposure location of a light beam in a subinformation recording start location based on the acquired positional information and outputting a subinformation record signal to the wave setting section 7 by step 41f, the BCA record sequence 42 is started. When there is no exposure location of a light beam in a subinformation recording start location, the system control system 12 drives a signal in the delivery motor control section 10, delivery and the delivery motor control section 10 drive the delivery motor 9 based on this signal, an optical pickup 4 is made to move slightly, and it is made to move to a subinformation recording start location. It returns to step 41e again after this.

[0055] Next, the BCA record sequence 42 is explained. By step 42a, record data (subinformation), such as identification information recorded on an optical disk 1, are coded, and a BCA pattern (record signal) is created. In step 42b, the wave setting section 7 generates a laser modulated wave form based on a BCA pattern. The wave setting section 7 operates orthopedically the BCA signal sent from the BCA signal generation section 6, and the laser modulated wave form where the BCA signal was reversed for the one-revolution pulse signal from the roll control section 3 as timing based on the rotational frequency from the system control system 12. Moreover, the wave setting section 7 outputs a laser modulated wave form, when the subinformation record signal from the system control system 12 is received, and when not receiving a subinformation record signal, it performs a bias output. While an optical disk 1 rotates one time, step 42c and step 42d are performed by coincidence.
[0056] In step 42c, BCA record is performed on an optical disk 1. The laser mechanical component 5 performs a laser drive based on the laser output value specified from the system control system 12, and the laser modulated wave form from the wave setting section 7, and a laser beam is outputted like drawing 5 (4). The optical output in drawing 5 (4) is a laser output from which energy required for output 51a to crystallize the record film 26 of an optical disk 1 is obtained, and output 51b is the output (for example, playback power) of extent which does not crystallize the record film 26 of an optical disk 1. As shown in drawing 6 , by irradiating this modulated light beam at the record film of an optical disk 1, the intermission of the crystallization is carried out and BCA is recorded.
[0057] In step 42d, while an optical disk 1 makes one revolution, only an amount predetermined with constant speed moves an optical pickup 4 in the direction of a path of an optical disk 1 like drawing 7 . A stripe-like BCA pattern is formed in the subinformation record section of an optical disk 1 by performing step 42c and step 42d to coincidence.
[0058] By step 42e, a position transducer 11 detects the location of an optical pickup, and transmits positional information to the system control system 12. While detecting that the system control system 12 has the exposure location of a light beam in a subinformation record section based on the acquired positional information and outputting a subinformation record signal to the wave setting section 7 by step 42f, it returns to step 42b. When the exposure location of a light beam comes outside a subinformation record section, it moves to the initialization sequence 91 shown in drawing 10 .
[0059] Next, the initialization sequence 91 is explained. If the exposure location of a light beam comes outside a subinformation record section and it goes into an initialization field, an initialization control system will perform system control with the change-over vessel 83. The system control system 12 switches a signal to the roll control section, and switches delivery and a rotation condition to a CLV condition from CAV by step 91a. The system control system 12 controls a laser output by step 91b to be power required for the record film 26 of an optical disk 1 to crystallize a signal to the linear velocity to which delivery and the laser mechanical component 5 were set, and to become fixed at the laser mechanical component 5. By step 91c, while an optical disk 1 makes one revolution, the delivery motor control section 10 drives the delivery motor 9, and only a predetermined amount moves [section] an optical pickup. By step 91d, a position transducer 11 detects the location of an optical pickup, and transmits positional information to the system control system 12. Based on the acquired positional information, the system control system 12 detects that the exposure location of a light beam is in an initialization field, and returns to step 91c. When the exposure location of a light beam comes outside an initialization field, it moves to the termination sequence 43.
[0060] Next, the termination sequence 43 is explained. The system control system 12 returns a signal to the laser mechanical component 5, and returns delivery and a laser output to playback power by step 43a. By step 43b, the system control system 12 suspends delivery and focal control for a signal to the focal control section 8. The system control system 12 makes a signal the laser mechanical component 5, and makes delivery and a laser output zero by step 43c.
[0061] By the above actuation, after recording BCA by changing the phase state of record film 26 to the subinformation record section on an optical disk 1, initialization processing of an optical disk 1 can also be performed continuously, and a manufacture process can be simplified.
[0062] In addition, although the case where it initialized in the state of CLV was explained in the

example 2 after performing BCA record in the state of CAV, it is also possible to carry out after [initialization] BCA record. Moreover, it is also possible by controlling laser output reinforcement in accordance with linear velocity to perform BCA record and initialization continuously with a CAV condition. Moreover, it is also possible to perform BCA record and initialization continuously with a CLV condition by attaching a rotary encoder to a spindle motor and generating a laser modulating signal on the basis of the angle-of-rotation signal of the optical disk 1 detected by said rotary encoder at the time of BCA record.

[0063] (Example 3) By preparing the hole (a hole being called below) in which the through tube or cave-in which penetrates a recording layer and/or record film is prepared using the equipment shown by drawing 8 explains how to record a BCA pattern. Compared with the approach of recording a BCA pattern by one laser luminescence to one BCA pattern which is the conventional example, by irradiating an optical spot sufficiently smaller than the BCA pattern to form over multiple times, the thermal effect on record film and its periphery and a thermal damage can be reduced, and a good hole (BCA pattern) can be formed by this invention. Moreover, as shown in drawing 11 , it is realizable by raising a laser beam output to power 111a which film destruction generates at the BCA Records Department. According to this approach, initialization processing of an optical disk can also be performed, and a hole can be made in record film as usual, and BCA record can also be carried out.

[0064] After performing BCA record for concrete actuation of this equipment in the state of CAV as an example using the flow chart of drawing 12 and drawing 13 , the case where it initializes in the state of CLV is shown below. The procedure of this equipment is roughly divided into four sequences, and consists of the starting sequence 41, the BCA record sequence 121, an initialization sequence 131, and a termination sequence 43. Moreover, in radius location 34b of drawing 3 , and an initialization starting position, radius location 34a of drawing 3 and a subinformation record termination location set [a subinformation recording start location] radius location 34a of drawing 3 , and an initialization termination location to radius location 34c of drawing 3 .

[0065] It rises first and a sequence 41 is explained. By step 41a, a spindle motor 2 is driven by the roll control section 3 based on the directions from the system control system 12, and an optical disk 1 is rotated at a fixed rotational frequency (CAV condition). By step 41b, the delivery motor 9 rotates the screw 13 which supports an optical pickup 4, moves an optical pickup 4 in the direction of a path of an optical disk 1, and is moved to a subinformation recording start location. By step 41c, the laser mechanical component 5 drives laser 14 based on the directions from the system control system 12. The light beam which carried out outgoing radiation from laser 14 lets the optical system of an optical pickup 4, and the last objective lens 15 pass, and is irradiated by the optical disk. The optical output by which outgoing radiation is carried out from laser 14 at this time is an output of extent which does not crystallize the recording layer 23 of an optical disk 1. Focal control is performed and the light beam which carried out outgoing radiation from laser 14 is made to condense on the record film of an optical disk 1 by step 41d. By step 41e, a position transducer 11 detects the location of an optical pickup, and transmits positional information to the system control system 12. While detecting that the system control system 12 has the exposure location of a light beam in a subinformation recording start location based on the acquired positional information and outputting a subinformation record signal to the wave setting section 7 by step 41f, the BCA record sequence 42 is started. When there is no exposure location of a light beam in a subinformation recording start location, the system control system 12 drives a signal in the delivery motor control section 10, delivery and the delivery motor control section 10 drive the delivery motor 9 based on this signal, an optical pickup 4 is made to move slightly, and it is made to move to a subinformation recording start location. It returns to step 41e again after this.

[0066] Next, the BCA record sequence 121 is explained. By step 121a, record data (subinformation), such as identification information recorded on an optical disk 1, are coded, and a BCA pattern (record signal) is created. In step 121b, the wave setting section 7 generates a laser modulated wave form based on a BCA pattern. The wave setting section 7 operates a laser modulated wave form for the one-revolution pulse signal from the roll control section 3 orthopedically as timing based on the BCA signal sent from the BCA signal generation section 6, and the rotational frequency from the system control

system 12. Moreover, the wave setting section 7 outputs a laser modulated wave form, when the subinformation record signal from the system control system 12 is received, and when not receiving a subinformation record signal, it performs a bias output. While an optical disk 1 rotates one time, step 121c and step 121d are performed by coincidence. In step 121c, BCA record is performed on an optical disk 1. The laser mechanical component 5 performs a laser drive based on the laser output value specified from the system control system 12, and the laser modulated wave form from the wave setting section 7, and a laser beam is outputted like drawing 11 (1). In the optical output in drawing 11 (1), output 111a is a laser output from which energy required to destroy the record film 26 of an optical disk 1, and prepare a hole is obtained, and output 111b is the output (for example, playback power) of extent which does not crystallize the record film 26 of an optical disk 1. By irradiating this modulated light beam at the record film of an optical disk 1, BCA which was made to carry out the intermission of the hole to a recording layer and/or record film, and equipped them with it is recorded.

[0067] In step 121d, while an optical disk 1 makes one revolution, only an amount predetermined with constant speed moves an optical pickup 4 in the direction of a path of an optical disk 1. A stripe-like BCA pattern is formed in the subinformation record section of an optical disk 1 by performing step 121c and step 121d to coincidence. By step 121e, a position transducer 11 detects the location of an optical pickup, and transmits positional information to the system control system 12. While detecting that the system control system 12 has the exposure location of a light beam in a subinformation record section based on the acquired positional information and outputting a subinformation record signal to the wave setting section 7 by step 121f, it returns to step 121b. When the exposure location of a light beam comes outside a subinformation record section, it moves to the initialization sequence 131 shown in drawing 13 .

[0068] Next, the initialization sequence 131 is explained. If the exposure location of a light beam comes outside a subinformation record section, an initialization control system will perform system control with the change-over vessel 83. The system control system 12 returns a signal to the laser mechanical component 5, and returns delivery and a laser output to playback power by step 131a. An optical pickup 4 is moved in the direction of a path of an optical disk 1, and it is made to move to an initialization starting position by step 131b.

[0069] The system control system 12 switches a signal to the roll control section, and switches delivery and a rotation condition to a CLV condition from CAV by step 131c. The system control system 12 controls a laser output by step 131d to become fixed by power required for the record film 26 of an optical disk 1 to crystallize a signal to the linear velocity to which delivery and the laser mechanical component 5 were set to the laser mechanical component 5. By step 131e, while an optical disk 1 makes one revolution, the delivery motor control section 10 drives the delivery motor 9, and only a predetermined amount moves [section] an optical pickup. By step 131f, a position transducer 11 detects the location of an optical pickup, and transmits positional information to the system control system 12. Based on the acquired positional information, the system control system 12 detects that the exposure location of a light beam is in an initialization field, and returns to step 131e. When the exposure location of a light beam comes outside an initialization field, it moves to the termination sequence 43.

[0070] Next, the termination sequence 43 is explained. The system control system 12 returns a signal to the laser mechanical component 5, and returns delivery and a laser output to playback power by step 43a. By step 43b, the system control system 12 suspends delivery and focal control for a signal to the focal control section 8. The system control system 12 makes a signal the laser mechanical component 5, and makes delivery and a laser output zero by step 43c.

[0071] By the above actuation, after recording BCA by making a hole in the subinformation record section on an optical disk 1 at record film 26, initialization processing of an optical disk 1 can also be performed continuously, and a manufacture process can be simplified.

[0072] In addition, although the laser output was made into playback power like drawing 11 (1) as a BCA record wave here except the BCA Records Department, there is also the approach of setting an initialization starting position to radius location 34b of drawing 3 , and making it initialization power

except the BCA Records Department like drawing 11 (3). According to this approach, since an initialization field becomes narrow, a throughput can be raised.

[0073] Moreover, although the case where it initialized in the state of CLV was explained in the example 3 after performing BCA record in the state of CAV, it is also possible to carry out after [initialization] BCA record. Moreover, it is also possible by controlling laser output reinforcement in accordance with linear velocity to perform BCA record and initialization continuously with a CAV condition. Moreover, it is also possible to perform BCA record and initialization continuously with a CLV condition by attaching a rotary encoder to a spindle motor and generating a laser modulating signal on the basis of the angle-of-rotation signal of the optical disk 1 detected by said rotary encoder at the time of BCA record.

[0074] While there is effectiveness which can control that a user alters medium identification information freely by establishing a hole in the recording layer and/or record film which were explained in the above-mentioned example 3, the same medium identification information as the mold optical recording medium only for playbacks can be formed.

[0075] In addition, although the example 3 explained the case where a hole was prepared at a recording layer and/or record film to record of medium identification information, this record approach is applicable also to the recording layer and/or record film in the main information field. If it applies to the main information field, though it is a rewriting mold optical disk, the record approach of the optical disk which becomes compatible with the rewritable mold and the postscript mold that the alteration of a part of information can be controlled can be attained.

[0076] Moreover, if the configuration which the linear velocity of the optical disk explained in the example 3 is optimized, and a recording layer and/or record film are liquefied, and is unevenly distributed with surface tension is adopted when a hole is established in a recording layer and/or record film for example Although the ingredient of a recording layer and/or record film is unevenly distributed with a hole near the after side edge side (namely, ending [record] point side) near the before [a hand of cut (namely, the migration direction)] side edge side (namely, recording start point side), a part for a hole Although the direction of the amount of maldistribution near the back side edge side increases and it becomes unsymmetrical [the configuration for a hole] from the amount of maldistribution near the front side edge side, since the optical change by part for a hole is large, it is fully absorbable. Furthermore, since the amount of hole is the maldistribution resulting from the surface tension of the ingredient of a melting condition, it can control the impulse force accompanying evaporation of an ingredient etc., and does not have generating of exfoliation of a recording layer and/or record film etc., either.

[0077] In addition, although the configuration of the optical disk applied to this invention is completely the same even if it is not equipped with a reflecting layer, in the case of the optical disk equipped with the reflecting layer with the configuration which prepares especially the through tube of an example 3, the configuration of a hole penetrated to a reflecting layer is desirable, and, in the case of the medium identification information penetrated to a reflecting layer, the completely same medium identification information as the mold optical recording medium only for playbacks is obtained in the case of.

[0078] Although said examples 1-3 described the fundamental record approach of BCA, an example 4 describes the recovery approach at the time of playback for the modulation approach at the time of record in detail hereafter. Furthermore, the following example 5 describes the example at the time of applying this BCA, and explains how to prevent the security fall by the alteration assumed by the initializer combination method of BCA.

[0079] (Example 4) The modulation approach of data is first stated to a detail using drawing 15 (a). First, in the Lead Solomon method error correction code (ECC) adjunct 715, as for the data which should be recorded, ECC717 is added to data 716. To 188 bytes of all data 716, Fig. 16 (a) calculates Lead Solomon and shows the data configuration which added 16 bytes of ECC717. Fig. 16 (b) shows the data configuration in the case of recording data [12 bytes of] 716a. The amount of data of the ECC717a section is 16 bytes, and the ECC section and data size in case data are 188 bytes do not change.

[0080] The ECC operation of this invention is not calculated to 12 bytes of data 716a like usual, when data are 12 bytes. As shown in (b) of Fig. 17, imagination data configuration [188 bytes of] 716b which put 0 into 166 bytes from RS2 which does not exist as a stereo from the line of the last of RS1 to the 3rd line of RSn is created, an error correction is calculated, and ECC717b is calculated.
[0081] Since each operation program is required, program capacity and room may become large and may stop being sufficient by the conventional method which performs a total of 12 kinds of ECC operations including for 44 to 188 bytes, when 8 bits or the 16-bit microcomputer of the small capacity for control of a DVD drive performs the correction operation of BCA. [12 bytes, 28 bytes, and] There is effectiveness which can carry out ECC processing with the microcomputer of the small capacity of the existing drive by this invention.
[0082] (Synchronous sign) A synchronous sign is described below. Drawing 18 (a) shows sync bits 719a-719z. Since spacing of the fixed pattern of a synchronizing signal is 4T as shown in drawing 18 (b), it becomes easy to distinguish 3T and the alignment pattern of data.
[0083] (PE-RZ modulation) When recording BCA on the media of the record mold of a type which perform the same groove record as DVD-R and a DVD-ROM like DVD-RW, the data 716 containing an ECC code are the reverse code-conversion section 721 of the PE-RZ modulation section 720 for making it distinguish from a ROM disk, 1 of data and 0 are reversed and the PE-RZ modulation of them is carried out in RZ modulation section 722 and PE modulation section 723. When it explains using the wave form chart of drawing 20 , in (1), bit-flipping data and (2) show RZ modulation, and, as for input data and (1'), (3) shows a PE-RZ modulating signal. In the pulse width reduction-by-half section 724, pulse width becomes 50% or less, and, as for this modulating signal, a wave like drawing 20 (4) is acquired. In the case of a phase change mold disk like DVD-RW, a wave is made into opposition by the positive/negative inversion section 725, and as shown in the optical output of (5), only a BCA modulation part turns OFF initialization light of laser 726. Like drawing 20 (6), while a BCA pattern is recorded, the record film between BCA(s) crystallizes and is initialized. Since record pulse width is narrowed below at one half of an original PE-RZ modulating signal in the case of this invention, the width of the stripe of each slot becomes narrow in one half like drawing 20 (6). Furthermore, since a stripe has only one piece into two slots, in the BCA field 728, it becomes the part of one fourth of width that is, in all, and becomes a BCA part, i.e., the low reflective section, only one fourth by surface ratio.
[0084] When record film is a phase change ingredient, the reflection factor of the bright section which is a part before record is low before and behind 20%. If the signal of the record pulse width of the conventional PE-RZ signal is used as it is, as shown in drawing 20 (3), it becomes the umbra which is a part after one half recording, average reflectance becomes 10% order, and since the average reflected light decreases, it will have a bad influence on focusing. In this invention, since pulse width of BCA is made into one half, even if average reflectance turns into 75% or more of the reflection factor of a part without original BCA and an original pit and it uses phase change record film by the pulse width reduction-by-half section 724, 15% or more of average reflectance is obtained also in a BCA field. For this reason, a focus becomes easy and it is effective in being stabilized.
[0085] (When recording on DVD-R) When recording on DVD-R with this recording device, a positive/negative **** control signal is generated and the polarity of the optical output of drawing 20 (5) is reversed by sending to the positive/negative inversion section 725 again. For this reason, the reflection factor of the record film of DVD-R of the part which carried out laser luminescence falls, and BCA like drawing 20 (6) is recorded. Since there is a function which reverses a wave-like polarity, when recording on DVD-R, it is not made reversed, but in recording on DVD-RW, it is effective in the ability to have the function which records BCA on both media as making it reversed by one set. Since drawing 20 has the code pars inflexa 721, with a ROM mold disk, 1 of modulation data and the value of 0 are reversed. The modulating signal of a ROM mold disk is shown in drawing 19 for a comparison. [0086] In drawing 19 and drawing 20 , (1) input data is the same. However, since a code reversal signal is not sent in the case of ROM, the code pars inflexa 721 does not operate. For this reason, at the time of "0", a PE-RZ signal is arranged like drawing 19 (3) at a left-hand side slot, and a BCA pattern also serves as left-hand side like drawing 19 (b). On the other hand, a PE-RZ signal is arranged like drawing 20 (3) at a

right-hand side slot, and since a code reversal signal is sent, when it is "0" in the case of RAM mold media, such as DVD-RW and DVD-R, as shown in (c), a BCA pattern serves as right-hand side. Therefore, since the BCA patterns on a disk differ, BCA of BCA and RAM of ROM can be distinguished. Since the patterns of BCA differ even if an inaccurate contractor copies the data of a ROM disk using the RAM disk of DVD-RW or DVD-R, and since it will be distinguished if it is not a ROM disk, it is effective in an unauthorized use being prevented.
[0087] In this invention, the code pars inflexa 721 is turned OFF and BCA can be recorded on a ROM disk like drawing 19 by turning off the positive/negative inversion section 725. In DVD-RW, it is made into ON/ON, and, in the case of DVD-R, is made into ON/OFF, and in the case of DVD-RAM, if it is made OFF/ON, BCA of normal can record with one recording device. Thus, it is effective in BCA being recordable on DVD-ROM, DVD-R, DVD-RW, and four different media of DVD-RAM with the same recording device with two switch changes.
[0088] (Arrangement of BCA) Arrangement of BCA is shown in drawing 21 . In DVD-ROM and DVD-RAM, the BCA field 728 is arranged to a location with a radius of 23.5mm from a location with a radius [of the most inner circumference of lead-in groove area] of 22.3mm. The address 729 is recorded on this field, and since the record include angle of a BCA bar code is a maximum of 316 degrees from a minimum of 51 degrees, the non-Records Department exists in the specific include-angle range of a BCA field. In this free area 730, since the address can be read, the head of a regenerative apparatus can know its location. CDC 732 which shows the physical attribute of the disk which has a guard band 731 in 50 micrometers or more at the periphery section of a BCA field, and is in the periphery section further is recorded in the pit, and the BCA existence identifier 712, the disk class identifier 711, the anti-copying identifier 735 that shows an anti-copying disk, and the media key block 736, i.e., keys, are recorded.
[0089] In DVD-R or DVD-RW, 50 micrometers or more of subguard bands 739 for avoiding interference with the PCA field 737 of the trial writing field for power adjustment in the range of radius 22.1(21.9) mm to 22.3(22.1) mm of the inner circumference section of BCA, the RMA field 738 which records the history of power control on the range of radius 22.3(22.1) mm to 22.6(22.4) mm, and a RMA field and the BCA field 728 are formed in the inner circumference section of BCA. For this reason, the BCA field 728 surely exists from 22.77 to 23.45mm correctly for 23.5mm from the radius of 22.8mm. Thus, by making a BCA field narrow to radial compared with ROM, coexistence with PCA and RMA is attained and BCA can be used for DVD-R and DVD-RW. In this case, continuation initialization is begun from the inner circumference section at least, and the radius of 22.65mm continues it. And by carrying out intermittent luminescence based on a PE-RZ modulating signal, recording BCA, and changing to continuation luminescence completely in the radius of 23.57mm, BCA can be recorded by initialization and BCA can be recorded, without making RMA destroy.
[0090] (The playback approach) The playback approach of BCA is described using drawing 15 (b). First, CDC 732 is accessed with an optical head and it gets over in the 8-16 recovery section 738. It stops, when the BCA identifier 712 is read and the BCA identifier judging section 739 does not show "0", i.e., existence, from CDC to which it restored, when "1", i.e., existence, is shown, the disk class identifier 711 is read, only when record mold disks, such as DVD-R and DVD-RW, are shown in the disk class identifier judging section 740, the code reversal signal 745 is generated and the code pars inflexa 744 is operated.
[0091] On the other hand, when reproducing BCA data, an optical head is moved to the BCA field 728 shown in drawing 21 , a BCA signal is reproduced, it considers as a digital signal with the level slicer 714, a synchronizing signal is extracted in the synchronizing-signal-regeneration section 743, and it restores only to the BCA data 716 in the PE-RZ recovery section 742. When the above-mentioned code reversal signal 745 is ON, in the code pars inflexa 744, it changes, as shown in (1) from (1') of drawing 20 , and 1 and 0 are reversed. Since the code reversal signal 745 is not generated in the case of a ROM disk, a code is not changed. In this way, the original BCA data are reproduced normally, when BCA is less than 188 bytes like drawing 17 (b) in the Lead Solomon error correction section 746, zero data is added, an ECC operation is virtually performed as 188 bytes, an error correction is carried out, and a

BCA signal is outputted correctly.
[0092] (Example 5)
(The record approach of Disk ID) Drawing 22 shows the typical production process of a RAM disk with BCA. First, the cryptographic key group 700 which contains two or more 1-n-th codes with the code encoder 803 using the 1st cryptographic key 802, such as a public key and a private key, is enciphered, and the 1st code and 805 are created. This 1st code 805 is modulated by eight to 16 modulator 917 of mastering equipment, and it is recorded on the 1st record section 919 which has this modulating signal in the inner circumference section of original recording 800 with laser as a concavo-convex pit. As drawing 21 specifically showed, it is recorded on the CDC field 732 with the BCA identifier 711, the disk class identifier 712, and the anti-copying identifier 735. The disk-like transparence substrate 918 is fabricated by making machine 808a using this original recording 800, the record film which consists of a phase change mold record ingredient or a charge of a coloring matter material by record film creation machine 808b is formed in one side of the transparence substrate 918, the single-sided disks 809a and 809b of 0.6mm thickness are created, these two sheets are stuck by lamination machine 808c, and a completion disk is created. To the 2nd record section 920 of this completion disk 809, with the recording apparatus 807 of BCA, the information on a disk ID 921 or the 2nd cryptographic key 923 for the Internet communication link is modulated by PE-RZ modulator 807a which combined PE modulation and RZ modulation, this modulating signal is recorded by laser 807b, a BCA pattern is formed, and the record mold disk 801 with BCA is manufactured. In the case of a phase change mold record ingredient, two processes, an initialization process and a BCA record process, can be unified at one process by using the initializer of this invention as a BCA recording device. When this process is described, since record film after forming membranes by record film creation machine 808b is in an amorphous condition or a horse mackerel depository condition, its reflection factor is as low as 10% or less. When using an initializer, with a boiled-fish-paste lens, a laser beam is converged on the beam spot of a stripe configuration long to radial, image formation is carried out on a recording surface, and a disk is rotated. A beam is moved to the periphery section with rotation, and by making it irradiate continuously, record film changes from the amorphous condition that a reflection factor is low to a crystallized state with a high reflection factor, and is continuously initialized from inner circumference on the periphery. By turning off, the signal, i.e., the laser light, of 0, and turning on in "0 Condition" in "1 Condition" of a PE-RZ signal in the 2nd record section, at this time, the signal, i.e., the laser light, of 1 In the part which turned OFF laser, since an amorphous condition remains, it is still a low reflection factor, and since it will be in a crystallized state, it becomes a high reflection factor, and a bar code is formed on a periphery as a result, and BCA is recorded in the turned-on part. If a laser beam goes to the periphery section of BCA and reaches the inner circumference section of the guard band 731 of drawing 21 , by changing continuously into ON condition the laser which is carrying out spacing luminescence according to the BCA signal, from a guard band 731, all the record film of the periphery section will be crystallized that is, initialized, and will be initialized to the outermost periphery.
[0093] In DVD-RW it is shown in drawing 21 -- as -- the inner circumference section of BCA, since there are the PCA field 737, the RMA field 738, and a guard band 739 up to a field with a radius of 22.4mm when radius the tolerance of 22.6mm will be considered from a field with a radius of 21.9mm, if radius the tolerance of 22.1mm is considered at least The first inner circumference section carries out continuation luminescence of the laser, and a radius starts intermittent luminescence based on a BCA modulating signal in the location between 22.65mm and 22.77mm (for about 22.6-22.8mm). A BCA pattern is recorded on the BCA field 728, and it changes from intermittent luminescence to continuation luminescence in the location of a between with a radius [of 23.45mm / a radius to] of 23.55mm. Since BCA is not recorded on the guard band 731 of drawing 21 by this but the PCA field 737 of the inner circumference section of CDC 732 of the periphery section of BCA or BCA and the RMA field 738 are initialized by perimeter completeness by it, it is effective in the ability to read data and the address to stability with the optical head of PCA and a RMA field.
[0094] Since the lamination disk is used, BCA included in inside cannot be altered but can be used for a security application. Moreover, DVD-RAM and the DVD-RW drive which are usually marketed have

the circular beam spot. Since an amorphous condition remains between trucks even if an inaccurate user is going to alter a BCA part with the circular beam of this commercial drive and eliminate BCA, BCA is not completely eliminable. Therefore, in a commercial drive, since BCA data cannot be altered, the security effectiveness high as a noncommercial use is acquired. on the other hand -- groove record mold RAM disks, such as DVD-RW and DVD-R, -- using -- DVD-ROM -- a similar disk may be copied. In order to prevent this, as drawing 20 explained, only the data division of a PE-RZ modulation make a ROM disk and the modulation Ruhr reverse by polarity-reversals section 820b of a code. That is, in the case of RAM, when BCA data are "0" and "1" in the case of ROM, a modulating signal sets to "01" and "10" respectively what was "01" in "10" respectively. Then, since it can distinguish even if it makes the copy disk of ROM using RAM, since the PE-RZ modulating signals of ROM and RAM differ, and injustice can be detected, prevention becomes possible.

[0095] (Application to protection of copyrights) The application which uses BCA with this difficult alteration for protection of copyrights using drawing 23 is described. In case the contents by which the copy was first permitted to the RAM disk once are recorded, the procedure which uses BCA and is enciphered is described. When a copy authorization identifier is detected once, by accessing the BCA field 920 of RAM disk 856, and carrying out a PE-RZ recovery in the BCA playback section 820, the data of BCA are reproduced and ID857 of a disk proper is outputted. Moreover, although the 1-n-th keys 700, i.e., two or more keys, are recorded on the 2nd record section 919 of 856 of a RAM disk, by the key selection section 703, the key permitted to each manufacturer's drive is selected, it decodes by the code decoder 708, and "the 1st key" is generated. "The 2nd key" is generated by on the other hand calculating ID857 of this the "1st key" and a disk proper with a tropism function in operation part 704. This key changes with each RAM disks and is peculiar. This the "2nd key" is sent to the encryption section 706 of the encryption section 859. [0096] The contents key 705 is generated by the random-number-generation section 709 of the contents key generation section 707 in the encryption section 859. This contents key is enciphered in a cryptopart 706 using the above-mentioned "2nd key." This "enciphered contents key" is recorded on the record section 702 of a disk 856 by the record circuit 862.

[0097] On the other hand, using the contents key 705, it is enciphered with the code encoder 861 and the contents 860 which consist of sound signals, such as video signals, such as a movie, and music, etc. are recorded on the record section 702 of RAM disk 856 by the record circuit 862.

[0098] Next, the procedure which reproduces this contents signal is explained using the block diagram of drawing 23 , and the flow chart Fig. of drawing 24 . First, a disk is inserted (step 714a), in response to the playback instruction of contents (step 714b), the anti-copying identifier 735 in CDC 732 of a disk is seen, and it judges whether the disk is anti-copying disks, such as CPRM, (step 714c), and if it is not an anti-copying disk, it will reproduce as it is (step 714d). If it is an anti-copying disk, the BCA identifier 712 in CDC is read by step 714e. Moreover, BCA is not reproduced when the BCA identifier 712 (step 714e) of CDC does not show existence of BCA (step 714f) (step 714g). At this time, the information on BCA containing ID857 is reproduced by the PE-RZ recovery section of the BCA playback section 820 from the BCA field of RAM disk 856 (step 714n). CDC 710 which has recorded the physical attribute of a disk 702 is read (step 714h), and the disk class identifier 711 (step 714h) judges [DVD-ROM, DVD-RAM, and] whether they are DVD-RW or DVD-R. In the case of DVD-RW or DVD-R (step 714j), the polarity of the code of data is reversed with polarity-reversals section 820b of PE-RZ recovery section 820a (step 714k). That is, if the reproduced modulating signal is "01", if it is "10", it is made "0" recoveries, and gets over by carrying out output data to the case of DVD-ROM, and reverse "1" (step 714m). By 8-16 recovery section 865a of the data playback section 865, it restores to the main data, and first, the keys 700 which consist of two or more keys from the key block field 919 are reproduced, the key which fitted the equipment by the key selection section 703 is chosen, it decodes in the code decoder 708, and "the 1st key" is reproduced. The above-mentioned "1st key" is calculated in operation part 704 with this ID857, and "the 2nd key" is generated (step 714p). So far, it is the same as the recording mode of above-mentioned contents. In the mode which reproduces encryption contents, the points which reproduce and decode "the enciphered contents key" from a disk 856, and decode the enciphered contents differ. In drawing 23 , a dotted line shows the flow of only the time of playback